Plum Creek Timber Company
Native Fish Habitat Conservation Plan

1997 - Thompson River
Riparian Reconnaissance and Monitoring

By

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Missoula, Montana

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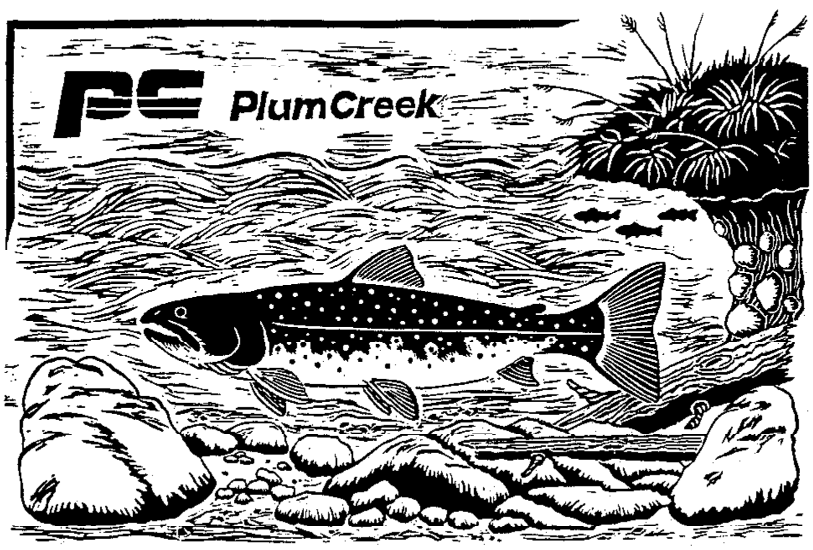

Plum Creek

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Riparian Reconnaissance and Monitoring on the Thompson River

for
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In this document, I report on riparian reconnaissance and monitoring activities performed in July and August, 1997 on Plum Creek Timber Company (PCTC) lands along the Thompson River in northwest Montana. Additionally, I discuss future successional changes which might occur with the vegetation of the area and present ideas on potential reclamation or restoration options. There are five appendices. In those, I return essentially all data collected for the project. There are also hand drawn maps and photos of various project locations. Inside of the back cover is a slot containing a map of the project area, and four mylar overlays which when aligned on specific PCTC aerial photos, show the locations of various data collection sites.

Methods

Riparian Reconnaissance Methods The entire project area was divided into eight polygons for general reconnaissance. Six of these polygons (#'s 2 through 7) are equivalent to six 'segments' (with the same numbers) used by Brian Sugden, Plum Creek hydrologist, in a PCTC report on a review of cattle impacts to the area (Sugden, 1995). Our other two polygons (1a and 1b) are two parts of a reach Mr. Sugden designated as his segment 1.

A polygon reconnaissance consisted of two individuals crisscrossing the width of the riparian area while walking the polygon end-to-end. For each polygon we recorded:

1) the riparian vegetation types (Hansen and others, 1995) and estimates of the percent of the polygon occupied by each,
2) other common plant species (without quantification of their covers),
3) noxious weeds,

4) estimates of the average riparian zone width and the width range,
5) stream geomorphology types (Rosgen, 1994) and estimates of the percent of the polygon channel length for each, and
6) comments.

We also completed a functioning condition assessment of the stream and riparian area (USDI BLM, 1995) for each polygon.

Monitoring Methods We established four cross sections and three vegetation study plots within the project area. See the project map on the inside of the back cover for these seven locations. For each of these seven cross sections or plots, we drew a free hand map of the immediate area, showing relevant features, distances, and angles. These maps are returned in Appendix A1.

The four cross sections are marked by two pieces of thirty by five eighths inch rebar driven into the ground to within 4-10 inches of their tops. These sets of rebar were subjectively placed, at approximately right angles to the channel. They mark the end points of each cross section. For cross sections 2 and 3, we added a third permanent rebar peg between the outer two. These middle pegs were installed because the outer two pegs were greater than 200 feet apart, the length of our tape. To aid in relocating rebar pegs which were not in close proximity to distinct natural features, we drove green, metal fence posts into the ground and drew their locations in relation to the pegs on the returned, hand drawn maps. The tops of these posts are 2.5 to 3.5 ft out of the ground.

We suspended a tape between the pieces of rebar, with the 0.0 end being at the rebar peg on the right bank facing downstream (called RP on the returned maps and in the picture descriptions for the right peg). Elevations along the cross sections were recorded to the nearest 0.00 ft using a rotating, invisible beam, laser level. At the RP and LP (peg on the left bank), the elevations were recorded for both the top of the peg and the ground level. Between the pegs, ground elevations were recorded at variable distances, usually 2 to 5 ft in relatively level or even-gradient portions of the floodplain. On and within the streambanks (so within the channel), elevations were usually recorded at closer intervals, some as close as 0.1 ft. Besides the elevations, we also recorded the most common plant species growing along the cross section and physical features such as the water's edge and channel thalweg.

The three vegetation plots are 81 feet by 3 feet arcs, which follow the natural arcs of the streambank in plots 2 and 3, and the bottom of an overflow channel in plot 1. These arcs (plots) were subjectively placed to show the current differences (and future differences with further monitoring) in numbers of young woody plants at sites with different herbaceous vegetation. Specifically we were attempting to show the effects of planted hay field grasses on the natural recruitment of trees and shrubs. While three vegetation plots are equal in size, they were each laid out and marked using different methods, which are described on the plot maps in Appendix 1, on pages A1.7 and A1.8.

We collected GPS location information for the cross sections and plots. For the cross sections, the readings were taken at the rebar pegs or at a recorded distance along the cross section line, when conditions (vegetative canopy, satellite configuration, etc.) were such that sufficiently accurate readings could not be obtained at the pegs. For vegetation plots 1 and 2, GPS locations were recorded on the tops of posts marking the plots. No GPS location was recorded specifically for vegetation plot 3 which is close to plot 2.

The GPS location data is returned on page A2.2 of Appendix 2. Further detailing of our field and office GPS methods is given in that Appendix, beginning on page A2.1.

For parts of the discussions below concerning the historical and potential plant communities in the project area, we performed some non-quantitative comparisons of four sets of aerial photos supplied by PCTC. To do that, we chose the following specific photos from the larger sets supplied by PCTC:

1935	1955	1969	1992
T 841 35	H45 3 15	H42A 37	47A 44 *
T 837 35	H44A 3 15	H41A 37	46A 41
T 838 35	H44A 3 14	H41A 36	45A 33 *
T 722 35	H43 35	H40A 38	44A 32
T 719 35	H42AN 20	H39A 37	44A 31 *
T 718 35	H42AN 19	H39A 35	44A 30 *

Within each year (column), the general order is from upstream to downstream going down the column. The mentioned mylar overlays showing the cross section and vegetation plot locations go with the four asterisked 1992 aerial photos.

Results and Discussion

Riparian Reconnaissance The recorded vegetation types and their estimated percents of the eight polygons are shown in Table 1. We used the following class codes and ranges to record the ocularly estimated percents:

T = 0.1<1%	2 = 15<25%	5 = 45<55%	8 = 75<85%
P = 1<5%	3 = 25<35%	6 = 55<65%	9 = 85<95%
1 = 5<15%	4 = 35<45%	7 = 65<75%	F = 95-100%

Table 1. Vegetation types, and their estimated amounts, recorded for the eight polygons.

Type*	Polygon	1a	1b	2	3	4	5	6	7
Tree Types									
Psemen/Corsto HT		P		T				P	
Picea/Calcan CT		T							
Picea/Equarv HT			T			T			
Poptre/Corsto HT							T		
Pincon DT							T		
Shrub Types									
Crasuc CT		2	2	5	P	T	2	7	1
Alninc CT		1	P						6
Saldru/Carros HT			1				1	T	2
Salgey/Carros HT		T	2				1		P
Potfru/Desces HT		T	T				1	1	P
Symocc CT							T	T	P
Betgla/Carros HT		T					T		
Corsto CT								T	
Saldru CT								T	
Graminoid Types									
Phaaru HT		5	5	4	5	5	4	1	T
Alopra DT					1	4	1		
Poapra CT		P			1	T	P	T	
Phlpra DT					1	P			
Agrsto CT					1			T	
Agrrep DT					1				
Carros/Carros HT							P	T	P
Carlas HT								T	
Elepal HT									T
Junbal CT							T		
Broine CT						T			
Poacom DT					T				
Upland Vegetation Types					P				

*See the types list in Appendix 3 for the full names of the vegetation types whose abbreviations are given here.

Though not quantified project-wide, the types are listed in Table 1 in approximate decreasing order within the tree, shrub, and graminoid groups. Overall, the project area is dominated by a few shrub and graminoid types. Tree types are relatively uncommon in the areas we considered to be riparian, but tree dominated areas are more common in adjacent valley bottom locations which we considered to be out of the riparian zone.

The *Crataegus succulenta* (succulent hawthorn) community type (Hansen and others, 1995) was the most common woody plant type recorded. *Crataegus douglasii* (black hawthorn) is the actual species present on the project, but it is ecologically equivalent to *Crataegus succulenta* (succulent hawthorn), and the *Crataegus succulenta* type name and description is used for areas dominated by both species (Hansen and others, 1995).

As suggested by Hansen and others (1995), the *Crataegus succulenta* community type in this situation may be somewhat ***disturbance induced*** in that long term disturbances may have increased the amount of area occupied by the type. That increase in the type may be most influenced by the decrease in other shrubs (namely willows) which probably have been removed by various disturbances. In contrast, one should not assume that the species *Crataegus douglasii* (black hawthorn) should not be on the site, nor that it should exist only in greatly reduced amounts. *Crataegus douglasii* (black hawthorn) is common along this general reach of the Thompson River and appears to be a natural component of the riparian vegetation. It is just the type that has probably increased due to the decrease of other shrub dominated types. That decrease in other shrubs is probably due either to purposeful removal by humans, or to long-term removal by selective livestock use.

The *Alnus incana* (mountain alder) community type is also relatively common within the project (Table 1). It too is thought to increase with disturbance (Hansen and others, 1995), but interestingly it was recorded only in polygons 1a, 1b, and 7 which as a group, have less obvious signs of historical disturbance than do the other five polygons.

The next two most common shrub dominated types, the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type and the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type are probably much less common now than they have been historically. We believe that significant amounts of both *Salix drummondiana* (Drummond willow) and *Salix geyeriana* (Geyer willow) were removed from the project area in efforts to convert the once shrub-dominated valley bottoms to hay fields.

This purposeful land use change has apparently occurred at various times throughout the project area according to changes apparent on the four sets (1935, 1955, 1969, and 1992) of aerial photos. The most obvious of these efforts observable on the aerial photos and on the ground, was the removal between 1969 and 1992 of shrubs from polygon 5.

In that polygon, waste piles to which the shrubs were probably bull dozed and burned, are still evident, confirming the change observable on the aerial photos.

While the amounts of the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type and the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type have apparently been reduced by efforts to develop agricultural lands, ***all*** of the most common graminoid types are probably either the direct result of those efforts or have at least been increased by those efforts.

The *Phalaris arundinacea* (reed canarygrass) habitat type is the most common type recorded on the project (Table 1). *Phalaris arundinacea* (reed canarygrass) is a native species which can naturally dominate riparian/wetland areas throughout Montana (Hansen and others, 1995). Recent research has suggested that a more aggressive exotic race of this species is now common throughout the northern Rocky Mountains. That exotic race is invading and dominating many areas which were either not originally inhabited, or only partially inhabited, by the native race (Lesica, 1997). The native *Phalaris arundinacea* (reed canarygrass) race probably occurred in northwest Montana prior to the introduction of the exotic race (Lesica, 1997).

Phalaris arundinacea (reed canarygrass) appears to have been a major component of the hay meadow grasses planted throughout the project area above Bend during the past 50 years. This cultivar (exotic race) of this species dominates large areas of polygons 1a through 5, growing in dense, tall stands which in places are essentially void of other plants. (See the photos for cross section 1, vegetation plots 1 and 2, and the general photos for polygon 4 in Appendix 5.) Many of the reclamation recommendations (below) take into account the amount of this species and its aggressive nature.

The five next most common graminoid types are *Alopecurus pratensis* (meadow foxtail) dominance type, *Poa pratensis* (Kentucky bluegrass) community type, *Phleum pratense* (common timothy) dominance type, *Agrostis stolonifera* (redtop) community type, and *Agropyron repens* (quackgrass) dominance type. These types are all similar to the *Phalaris arundinacea* (reed canarygrass) habitat type in that they could have been introduced to the area as components in hay meadow seed mixes. None of these other plants are native to the project area, and native species generally will not successfully invade vigorous stands of these plants, without some sort of disturbance to allow initial establishment of the native species.

Besides the vegetation types we also recorded the noxious weeds (according to Whitson and others, 1966) and other species which were either common or important (all trees and shrubs, native species which may indicate the potential of the areas, species which are known increasers & decreasers, etc.). We did not quantify the occurrence of either the noxious weeds, nor the group of other plants.

The noxious weeds observed (Whitson and others, 1966) included:

Centaurea maculosa (spotted knapweed)
Cirsium arvense (Canada thistle)
Cynoglossum officinale (common hound's-tongue)
Hieracium aurantiacum (orange hawkweed)
Hieracium pratense (yellow hawkweed)
Linaria vulgaris (butter and eggs)
Potentilla recta (sulphur cinquefoil)
Urtica dioica (stinging nettle)

The weeds observed in each polygon are listed on the first page of the two page reconnaissance field forms for the eight polygons in Appendix 4.

The other common or important species recorded are also listed for each polygon on the first page of the field forms. All plants recorded in the project are listed in a species list (Appendix 3) which gives the scientific name, a common name, and the six-letter code for each species.

The Rosgen (1994) geomorphological stream types recorded are also only listed on the returned reconnaissance field forms (i.e. they are not displayed elsewhere). While various stream types imply certain conditions related to the cross sectional shapes and numbers of channels (e.g. braided D streams), it is erroneous to imply too much from simply knowing the stream type designations alone. For example, braided streams (D types) are often considered undesirable as they may indicate weak, unstable banks which have lead to the braiding of the channel. In contrast, E streams (single thread channels which are relatively narrow and deep) are by implication desirable. But, stable D channels may be more desirable than unstable and degraded E channels.

For the purposes of this report and as a recommendation for PCTC's management of the project area, I deemphasize the value of stream type interpretations when considered alone. Instead I include interpretations of the stream types in my considerations while performing the the functioning condition evaluations.

The functioning evaluation checklist as outlined in the BLM document TR 1737-9 1993, is a decent tool for evaluating of the functioning of the stream and adjacent portion of the riparian zone. Its format is simply a checklist for which the respondent replies Yes, No, or Not Applicable to statements about 17 topics in three major groups: Hydrologic, Vegetative, and Soils - Erosion Deposition. The statements are worded such that Yes answers indicate desirable situations. The strength of the procedure is that respondents must consider and evaluate the functioning of a wide variety of factors before making a call on the overall functioning of the system. The respondents are allowed to weigh the conditions of the various factors as they see fit for the final determination. That final determination is an assignment to one of three functioning condition categories: PFC (Proper Functioning Condition), Functional - At Risk, or Nonfunctional. For Functional - At Risk calls, the respondents determine the trend: Upward, Downward, or Not Apparent.

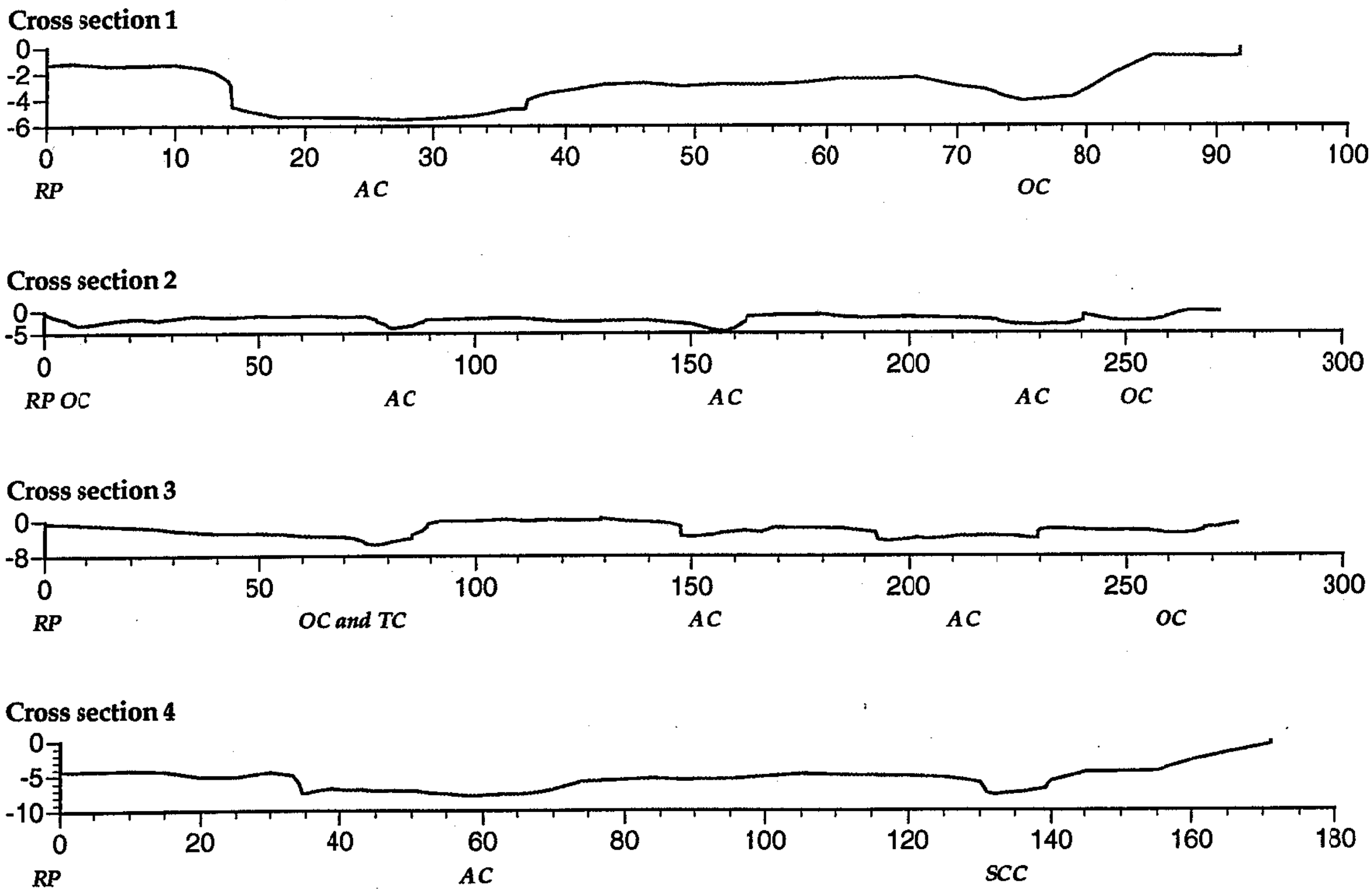
The results of our assessments for the eight polygons are presented in Table 2. Four polygons each were determined to be functioning properly (PFC) and Functional-At Risk. We said that the trend was not apparent in three of the four Functional-At Risk polygons, and speculated that it was probably upward in the fourth (#6). A large runoff event in the spring of 1997 which carried a huge amount of gravels into the project area was the cause of many of the functioning problems we saw in the polygons. Secondly, historic impacts of livestock grazing were evident and those impacts also affected the functioning in certain polygons. For most polygons we recorded comments on the functioning of the system. Those are on the bottom of the second page of each of the reconnaissance field forms (Appendix 4.)

Table 2. Functional condition assessment results for the eight polygons.

Polygon	Assessment Category	If At Risk, Current Trend
1a	Functional-At Risk	Not Apparent
1b	PFC	
2	Functional-At Risk	Not Apparent
3	Functional-At Risk	Not Apparent
4	PFC	
5	PFC	
6	Functional-At Risk	Upward
7	PFC	

Monitoring Figure 1 shows graphical representations of the four cross sections. The horizontal distances are shown for each, as are the elevations below the top of either the left or right peg, whichever is higher. The vertical scale (elevations) for each cross section has been adjusted so that the vertical and horizontal scales are essentially equivalent, resulting in more-or-less true representations of the ground surface by the cross section diagrams. The right peg is labeled for each cross section as are the types of channels within each. For a more complete 'picture' of each cross section, these graphical depictions in Figure 1 can be compared to the individual area maps in Appendix 1, the cross section data and the vegetation and geomorphological comments in Appendix 2, and the photos in Appendix 5.

Figure 1. **Cross section diagrams with the right peg (RP) and channel types indicated for each. The distances and elevations are in feet.**



RP = right peg AC = active channel OC = overflow channel TC = tributary channel SCC = spring creek channel

The main value of the cross section data is for long term monitoring of changes to both the cross sectional morphology and the vegetation along the cross section lines. To aid in the interpretation of changes, we have recorded some comments on the area maps (Appendix 1) and with the cross section data (Appendix 2) concerning the condition of the areas at the cross sections. Additionally, some of the comments on the polygon reconnaissance forms are generally applicable to the cross section areas.

With the recent decrease in the amount of livestock use in the area, there are some limited predictions of changes which may be seen over time at the cross sections. I would expect that in cross sections 2 and 3 there will be a conversion to single channel systems, with deepening and narrowing of one of the active channels and the eventual filling (at least partial filling) of the other currently active channels and the overflow channel areas. At cross section 4 the channel may become slightly more narrow and deeper, but I would not predict it will eventually have the depth of cross section 1.

The three vegetation plots were subjectively placed to both assess the past effects of *Phalaris arundinacea* (reed canarygrass) and the other planted hay meadow grasses on woody vegetation recruitment and establishment, and to allow monitoring over time of that recruitment and establishment. During our reconnaissance we had noticed a consistent pattern of occurrence of young woody plants in areas with *Phalaris arundinacea* (and in areas of dense stands of the other hay meadow grasses.) There was generally either no young shrubs under the *Phalaris arundinacea,* or the shrubs present were at least several years old and several feet tall. We rarely observe shrubs which appeared to be one or two years old and which were in the range of a few inches to approximately 1.5 feet tall. Also, in the riparian areas without a heavy cover by *Phalaris arundinacea,* there were often shrubs of all ages and sizes.

Our thoughts were and are that heavy stands of the *Phalaris arundinacea,* without disturbance prevent the establishment of woody vegetation. Competition for both above (light) and below ground (nutrients, moisture, space, etc.) resources favors the established, rhizomatous *Phalaris arundinacea* in comparison to the seedling shrubs. (See the general photos for polygon 4 in Appendix 5.) The long term effect if this is true is that the *Phalaris arundinacea* will prevent the establishment of new woody vegetation in the absence of disturbance which results in suitable recruitment locations. Those areas within the project which do not now have established shrubs within the *Phalaris arundinacea* may stay without shrubs for years, if not decades.

Vegetation plots 1 and 2 were placed within heavy stands of *Phalaris arundinacea.* Vegetation plot 3 is near plot 2, but in an area with shorter graminoids and no *Phalaris arundinacea.* All three plots are close to the river in both elevation and horizontal distance. In the reconnaissance, we observed seedlings growing in geographic positions similar to all three plots.

We observed no young shrubs or trees in vegetation plots 1 and 2. In contrast, we counted 203 plants, of at least 6 different shrub species (there was at least one, but possibly more, species of willow) in the 243 square feet of vegetation plot 3 (see the map on page A1.8 for the species and number of plants of each). Given the limited number of locations sampled and our subjective placement of these few plots, these results should not be considered to represent all locations within the project. Instead they are indicative of the amount of variation which can be observed. They do represent a pattern we repeatedly observed, but which did not occur universally.

Vegetation Succession Possibilities The possible vegetation succession scenarios represent a synthesis of the information gained in the Reconnaissance and Monitoring activities. Many of the ideas presented here were introduced in the preceding sections and they are repeated in the following section titled Reclamation Recommendations.

The occurrence of predictable vegetative succession in riparian areas is somewhat poorly documented in comparison to succession in upland areas. This is largely due to the inherently dynamic nature of the physical conditions of riparian areas in comparison to the stable, or more slowly changing, physical conditions of uplands. As illustration, to correctly predict riparian vegetation changes, one must usually base the prediction on a specific change, or lack of change, in the water regime of the area of concern. The water regime of a riparian area is highly influenced by a variety of on- and off-site, physical and biological factors such as climate, fire, beaver, human induced land management changes, etc. Consequently, while many authors have documented common riparian vegetation changes, they often stop short of using the observed changes as a basis for predicting other changes at different sites.

This dynamic nature does not remove any chance of predicting probable succession but it does limit the specificity of those predictions. Consequently, the following discussions are quite general. For simplicity, these discussions assume that the water regime in the project area will generally remain similar to what it is now.

As mentioned above, stands of *Phalaris arundinacea* (reed canarygrass) are not easily invaded by other vegetation. Even with significant disturbance, this plant can reestablish quickly, possibly precluding any significant vegetation change in areas it currently dominates. If change does occur in these relatively wet areas of this project it would probably be to willow (*Salix bebbiana, Salix boothii, Salix drummondiana,* or *Salix geyeriana*) or possibly conifer (*Picea, Pinus contorta, Pseudotsuga menziesii,* or *Abies grandis* [not recorded on site]) dominated vegetation types. *Phalaris* *arundinacea* (reed canarygrass) would probably still dominate the understory of these woody vegetation types. As the understory component it would still probably slow or stop further woody establishment. In a few rare cases, with significant disturbance and what I would consider as an unlikely revegetation scenario, the understory could change to native graminoid species such as *Scirpus microcarpus, Glyceria grandis, Glyceria striata, Calamagrostis canadensis,* or one of the observed *Carex* species. This understory change is unlikely at best.

Areas currently occupied by the *Alopecurus pratensis* (meadow foxtail) dominance type, *Poa pratensis* (Kentucky bluegrass) community type, *Phleum pratense* (common timothy) dominance type, *Agrostis stolonifera* (redtop) community type, and *Agropyron repens* (quackgrass) dominance type appear less resistant to successional changes than is the *Phalaris arundinacea* (reed canarygrass) habitat type. These areas, especially their drier extremes, may be periodically invaded by the local conifer species with little or no disturbance. More disturbance could result in the establishment of willows and other shrubs, in addition to the conifers.

In several locations we observed conifer invasion into areas currently occupied by tall shrubs consisting mainly of *Alnus incana, Crataegus douglasii,* and/or willows. This conifer invasion is not unexpected as stumps from logged conifer trees are noticeable in some of these areas. Most of these areas have generally higher stream gradients and often narrower, more confined, valley bottom than do sites currently dominated by graminoids. Currently many of these areas have understories of native herbaceous species. Unfortunately, *Phalaris arundinacea* (reed canarygrass) appears to be invading some of these areas and it is likely that invasion will continue, especially immediately adjacent to the river and other water sources. Other portions of the areas dominated by these tall shrubs may not be subject to the establishment of conifers, and the tall shrub types may persist into the foreseeable future.

It appears some areas currently occupied by the *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) habitat type are being invaded by larger shrubs. Additionally, those areas are probably susceptible to episodic invasion by conifers. At the same time, young *Potentilla fruticosa* (shrubby cinquefoil) were observed in some areas dominated by older, larger shrubs. In those areas, historic grazing may have reduced the reproduction of the larger shrubs, causing at least the appearance that *Potentilla fruticosa* was replacing those larger shrubs.

As a recap, the following generalizations about future vegetation succession within the project can probably be safely made:

1) areas currently with pure stands of *Phalaris arundinacea* (reed canarygrass) may remain as they are for indefinite time periods, and change will only follow significant disturbance,

2) *Phalaris arundinacea* (reed canarygrass) will probably persist in any understory it is currently in, and it will probably continue to invade other moist areas,
3) areas with the other introduced hay meadow species will probably convert to conifer and shrub dominated areas with time and/or disturbance,
4) areas currently dominated by *Alnus incana, Crataegus douglasii,* and willows will for the most part have at least a slow conversion to being conifer dominated, and
5) areas with other less common types such as the *Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) habitat type have uncertain futures, but they may show a net decline as conifers and tall shrubs (especially willows) increase.

Reclamation Recommendations

As with most subjective opinions, everyone who could potentially be asked to make recommendations on reclamation of this project area would probably have different ideas. I will try to point out a range of possibilities, state some strengths and/or weaknesses of each, and give some generalized suggestions as to what I believe is feasible.

The current trend, or bandwagon, in riparian reclamation is channel reconstruction. Many people would probably recommend that PCTC rebuild parts of the Thompson River channel. The main goal and justification for that type of activity would probably be to reduce the amount of braided channel. That would be a noble goal, but one I would not support. With reduced grazing there should be a natural stabilization of many banks in the project area and a reduced tendency of the channel to braid. It will take awhile, but I believe that areas such as cross sections 2 and 3, with multiple active channels will become less common, as a single thread channel system with overflow channels is reestablished.

I expect that with the natural stabilization of the streambanks, nearly all of the project area will be in proper functioning condition (according to TR 1737-9 1993) in a few years. There will still be some braided channel, and there will be some unstable sand and gravel streambanks, but the amounts of those should be within an acceptable range of variation for the system to be properly functioning.

I do have recommendations for vegetation reclamation activities. I believe these activities will speed the conversion of current graminoid dominated areas to shrub dominated areas.

It would be possible for PCTC to take a hands off approach to the vegetation as well as to the channel, being satisfied with the current suite of vegetation and any natural changes which occurred. The drawback to that 'no activity' option is that many areas currently without woody vegetation may remain that way. Barring a major flood event to reroute the channel and/or lay bare a significant amount of soil surface for woody reestablishment, many areas may remain populated only with *Phalaris arundinacea* (reed canarygrass) and the few other introduced grass species. Other than a major flood event to initiate woody plant recruitment, the other natural manner in which recruitment could occur would be through a cycle of beavers damming the main Thompson River channel, followed by breaching of the dams. Bare silted areas would then probably become at least partially colonized by shrubs and possibly trees.

Neither of these two scenarios for the natural reestablishment of woody plants (an extremely large flood or a cycle of beaver use) is guaranteed to occur at any time in the near future. For that reason I would recommend an active reclamation option.

There appears to be two possible levels of activity. The first would be restricted to hand scarification and planting of woody vegetation in areas on which there is a reasonable chance of success. These are areas which are currently bare or at least do not have well established stands of *Phalaris arundinacea* (and to a degree *Alopecurus pratensis* [meadow foxtail] and *Phleum pratense* [common timothy]). The second level of activity would be to use mechanical means to create more bare areas, and then to hand plant those created bare areas.

There are two general types of areas PCTC should consider for hand planting ***without*** mechanical scarification. First are a few banks along the main channel which because of their sandy and gravelly substrate have only limited amounts of herbaceous vegetation and little if any woody vegetation. A good example of this is in polygon 2, slightly below mid-polygon. A rather large bank there on the south side of the river is very unstable, and the limited vegetation is composed partially of upland herbaceous species. Other banks similar to this, but probably not quite as droughty, occur in polygons 3 and 6. On the most droughty of these banks, such as the one in polygon 2, planting of 1 or 2 year old stock from 10 inch^2 or smaller containers may not be successful as the plants could wilt the first year before their roots grew deep enough to keep the plant watered. Fall or very early spring planting would provide the best chance at success, whatever the size and age of the plant materials used. Planting during these times on these sites would insure the greatest amount of the time for downward root growth while the banks are relatively moist during the spring and early summer.

The second general type of locations for hand scarification and planting is along overflow channels in polygons 2, 3, and 6. Some of these channels have bare banks which could be hand planted without the use of mechanical scarification. Many of these are fine material banks which hold water well. Planted shrubs should thrive in these areas. Obvious planting sites (without mechanical scarification) on these overflow channel banks are probably more extensive than on the droughty main channel banks previously discussed.

Not knowing the effort and expense PCTC plans to put into revegetation, these hand scarification and planting efforts may be enough for the initial endeavor. Success here, or lack of success, could indicate to PCTC the validity of continuing their efforts to the potentially much more expensive mechanical scarification and planting.

If PCTC decides to mechanically scarify and then plant areas, the list of possible locations is large. The top six polygons (1a through 5) all have major amounts of the *Phalaris arundinacea* (reed canarygrass) habitat type, without woody vegetation. I would divide the project into these three general areas of decreasing priority: 1) the lower part of polygon 3, all of 4, and the upper portion of 5 to the bridge, 2) the lower part of 1a and upper part of 1b, and 3) the remaining portions of 1a through 5.

Once on site with the proper equipment, adequate scarification could be accomplished relatively quickly. The cost and effort of actually planting the young shrubs would probably then be the limiting consideration. Care would need to be taken to remove the heavily rooted upper soil layer from any site on which seedlings were to be placed.

The sites with *Phalaris arundinacea* (reed canarygrass) and the other mentioned hay meadow species generally have adequate soil moisture to insure that the planted stock would not wilt during the first year. Rapid recolonization and subsequent competition by the hay meadow species my provide the greatest impediment to success. PCTC may consider a follow up effort to hand scalp around individual plants after the first growing season if recolonization by those grass species appeared to be a problem.

I would suggest planting the following species (depending on availability), using primarily the three willows in the first group; lesser amounts of the next willow and dogwood, and the other three shrubs in limited amounts:

Booth willow (*Salix boothii*)
Drummond willow (*Salix drummondiana*)
Geyer willow (*Salix geyeriana*)

Bebb willow (*Salix bebbiana*)
red-osier dogwood (*Cornus stolonifera*)

mountain alder (*Alnus incana*)
bog birch (*Betula glandulosa*)
black hawthorn (*Crataegus douglasii*)

Other possible species which PCTC may consider for planting would be *Populus trichocarpa* (black cottonwood) and the various conifers recorded within the project area. *Populus trichocarpa* (black cottonwood) was not observed within the riparian areas of the project, but it does grow nearby.

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Appendix 1 - Cross Section and Vegetation Plot Maps

Table of Contents

Introduction

The following are abbreviations and explanations of features commonly used on the maps which follow, and in the photo descriptions (which are repeated with the photos in Appendix 5):

RP = Right peg of a cross section. The 0.0 ft end of the cross section distances. Applying usual hydrologic conventions, the left and right sides are determined looking downstream. Unfortunately these conventions and using the right peg as the zero end on the cross section results in the right peg being on the left hand side of the cross section diagrams [see Table 2 in the text.] The following maps are similar in that the right peg is generally in the left hand side of the map.

LP = Left peg of a cross section. Shown on the right side of the cross sections and maps.

MP = Middle peg of a cross section. There are middle pegs only on cross sections 2 and 3 where the total length was greater than 200 ft.

Vector = Directional lines on the map between two locations. There are distances and angles given for ***most*** vectors. The reverse angle for a vector is determined by either adding or subtracting 180 degrees, to or from the original angle. The vectors are labeled alphabetically (A, B, C, etc.).

Angles = All angles on these maps and in this report are in ***degrees west of magnetic north.***

Distances = The distances on the maps (usually along the vectors) are reported in feet and tenths of feet. When a vector is drawn from or to a tree, the distance is from or to the near side of the tree's base. When measuring to multi-stemmed shrubs, the measurement is approximately to the middle of the group of stems at the base of the shrub.

Photos descriptions. In most cases, the location from which a photo was taken is stated in the photo description. The photo descriptions at the bottom of each map are repeated in Appendix 5, with the photos.

Map orientation and scale. Each map is marked with an arrow which points approximately to the north.

Since the maps were hand drawn in the field there is often significant variation in local scale and sizes of the features in different regions of any one map. In many cases, we chose to exaggerate the scale in certain areas to show detail.

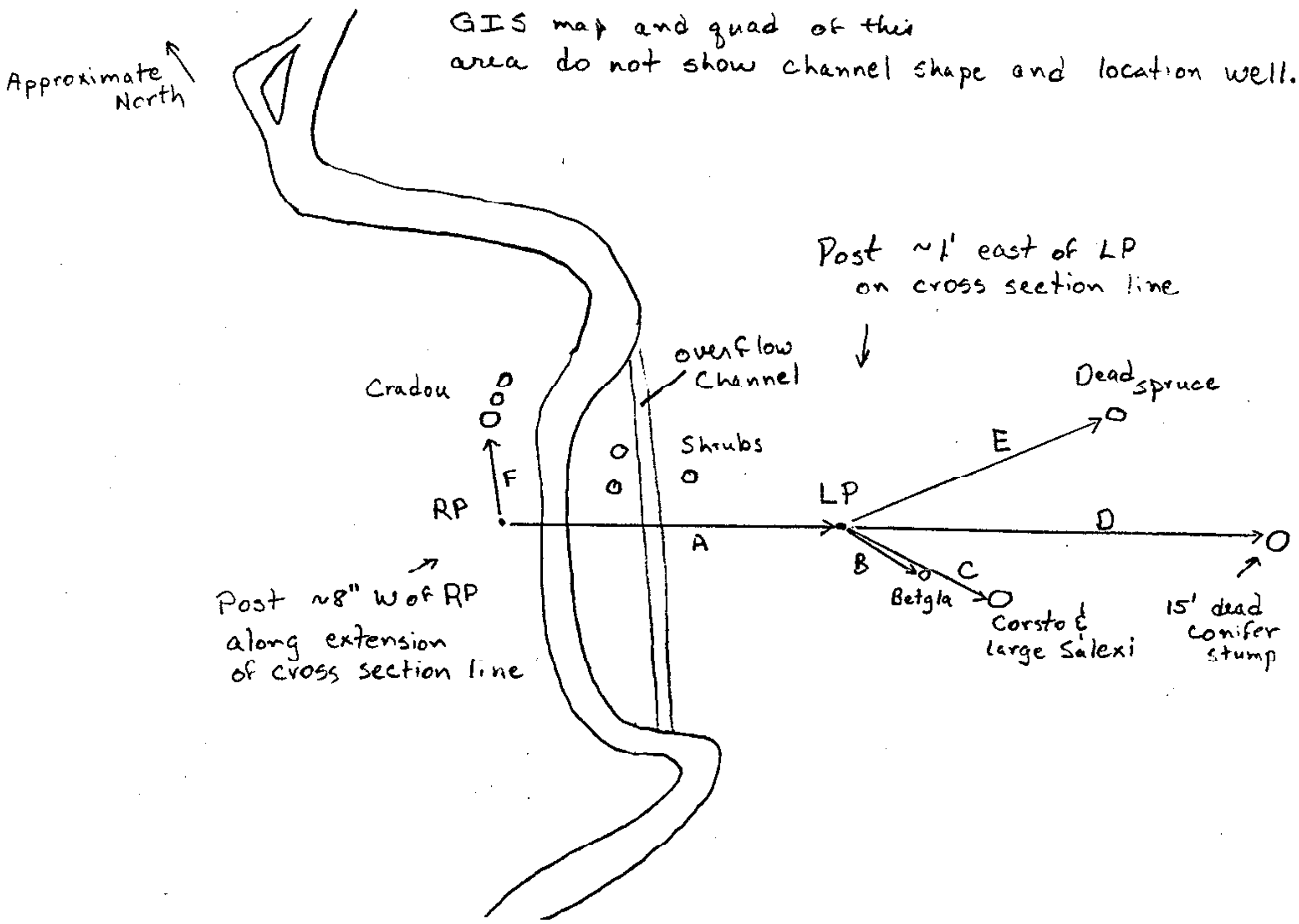
Other information. On each map we also state: 1) the polygon number where the cross section or vegetation plot is located, 2) the 1992 aerial photo number for which there is an enclosed overlay showing the location of the cross section or vegetation plot, 3) any locations within the mapped area at which GPS location information was collected, and 4) other information relevant to specific situations.

Cross Section 1

Located in pg 1a
Drawn on overlay for 1992 aerial photo #47A 44
GPS locations: at RP and LP

Vector	Angle (Deg's W. of N.)	Distance (feet)
A	240	91.7
B	230	26
C	245	37
D	240	NM
E	270	NM
F	350	NM

NM = not measured

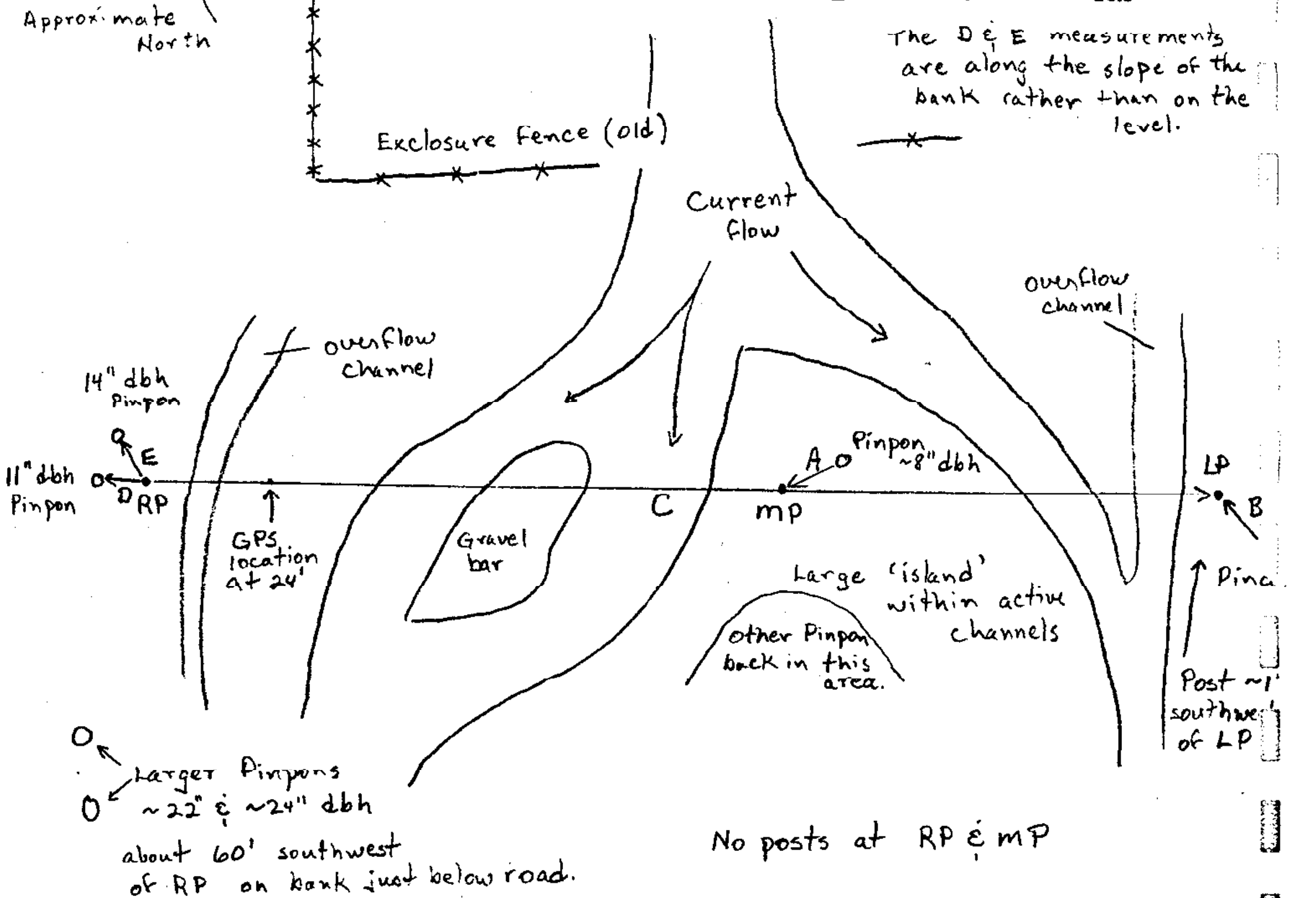


Photos:
1. From LP. View across river. Post near RP visible on opposite side of river in swath through PHAARU. The large CRADOU shown on map are visible to the right of photo's center.
2. From LP. Looking over PHAARU; SALEXI, BETGLA, CORSTO, and conifers behind. Photo taken approximately along the lines of vectors B & C.
3. From RP. View across river. The post near the LP is toward the back of swath through PHAARU. Photo taken along vector A
4. From RP. Looking over PHAARU at three large CRADOU (shown on map). Photo taken approximately along vector F.

Cross Section 2

Located in pg 3
Drawn on overlay for 1992 aerial photo #45A 33
GPS locations: at LP, MP, and at 24′ along cross section
from RP

Vector	Angle (Deg's W. of N.)	Distance (feet)
A	85	10.0
B	0	20.5
C	245 ~~65~~	271.7
D	65	11.6
E	0	10.5



Photos: 1. From MP toward RP. Laser level set up to left of cross section line, which is visible as yellow tape. RP is below, and directly in line with second largest PINPON in group beyond laser level. Photo taken opposite the line of vector C.

2. From LP. MP is just beyond short (~2′) shrub in photo center to left of PINPON and to the right of the downed log in shade of larger shrub. Photo taken opposite the line of vector C.

3. From a location on the road in line with the lower, cross-valley fence of old exclosure. That fence is visible in the photo. The cross section is to the right of the shrubs in the right and center/right of the photo.

Cross Section 3

Located in pg 6

Drawn on overlay for 1992 aerial photo #44A 31

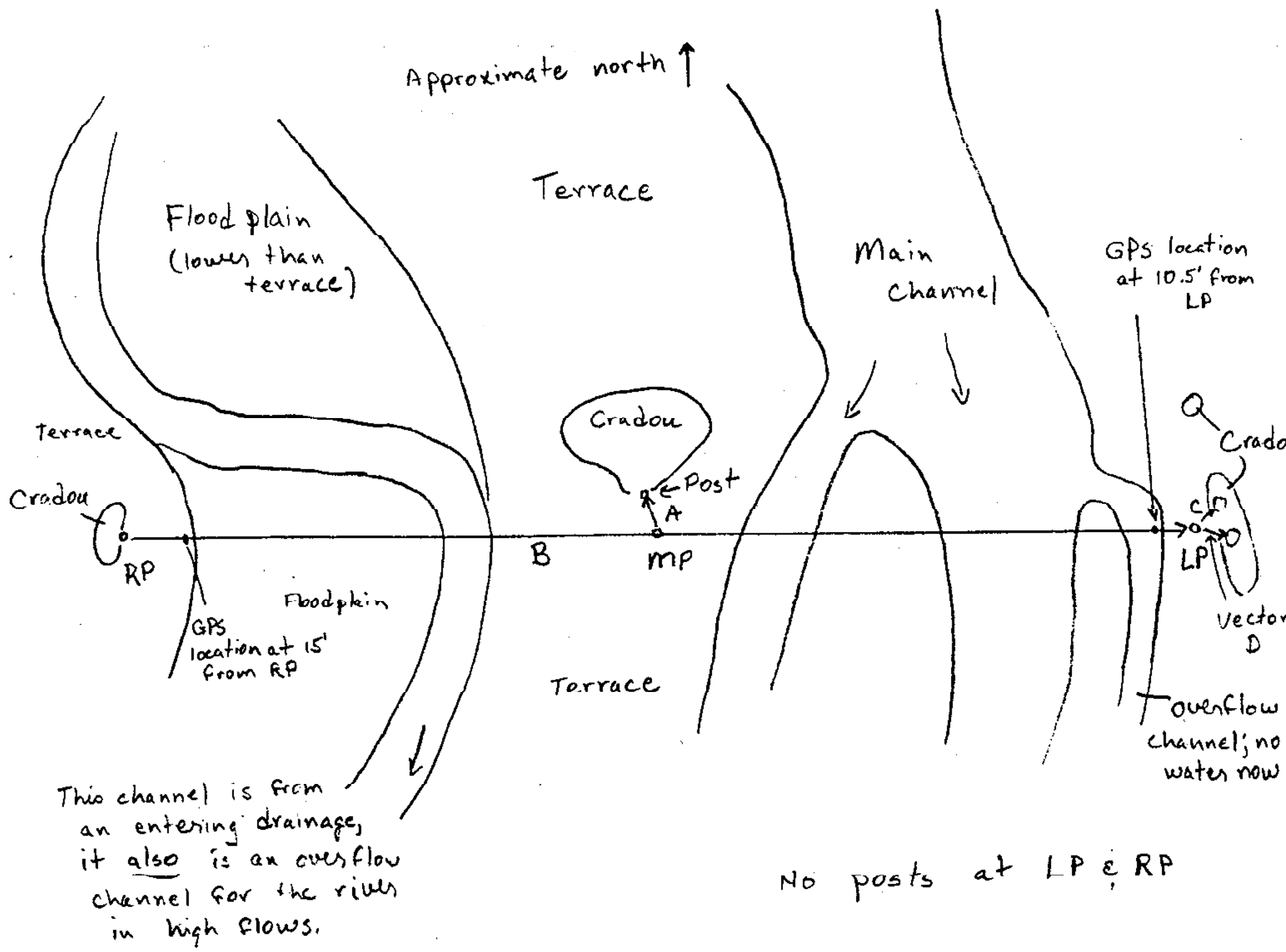
GPS locations: at MP;

at 15′ along cross section line from RP; and

at 10.5′ along cross section line from LP

Vector	Angle (Deg's W. of N.)	Distance (feet)
A	35	6.5
B	97	275.5
C	NR	11
D	NR	12

NR = not recorded



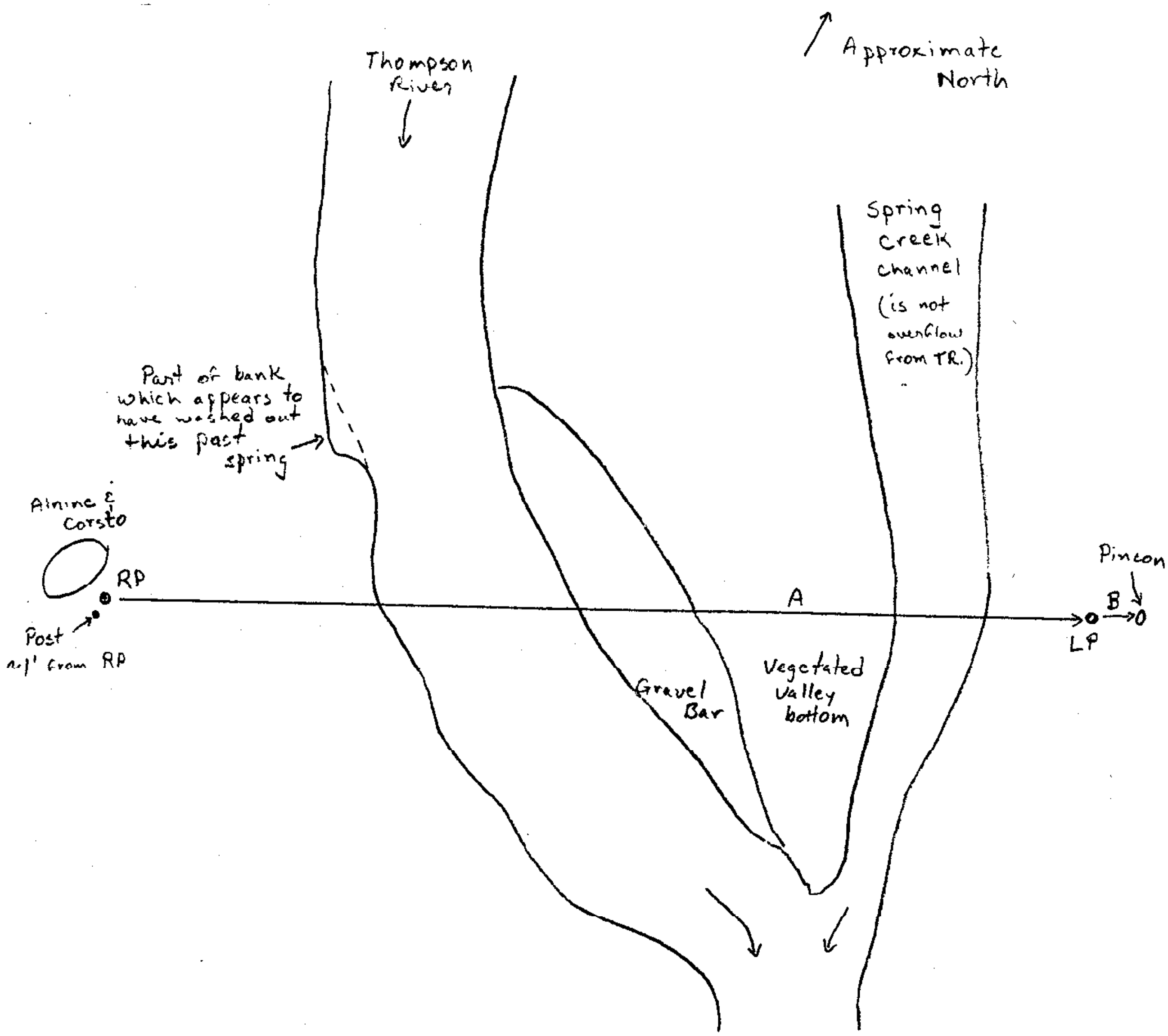
Photos: 1. From MP toward RP. Vadan in overflow channel taking cross section reading.

2. From LP. Tape suspended between LP and MP. Laser level near MP. CRADOU over LP can be seen in background, beyond and to left of laser level. Vadan on gravel bar in left of photo.

Cross Section 4

Located in pg 7
Drawn on overlay for 1992 aerial photo #44A 30
GPS locations: at RP and LP

Vector	Angle (Deg's W. of N.)	Distance (feet)
A	332	171.0
B	332	9.5



Photos: A. From RP. Vadan preparing to take cross section reading in channel. Laser level is set up beyond, and in line with LP. Note the tree directly beyond the laser level. That tree is at the end of vector B. Photo taken along vector A.

2. From LP. Spring creek channel in foreground, river beyond. Post near RP is slightly visible (more-so with a hand lens) on far bank near first taller shrub. Photo taken along the reverse angle of vector A.

Vegetation Plot 1

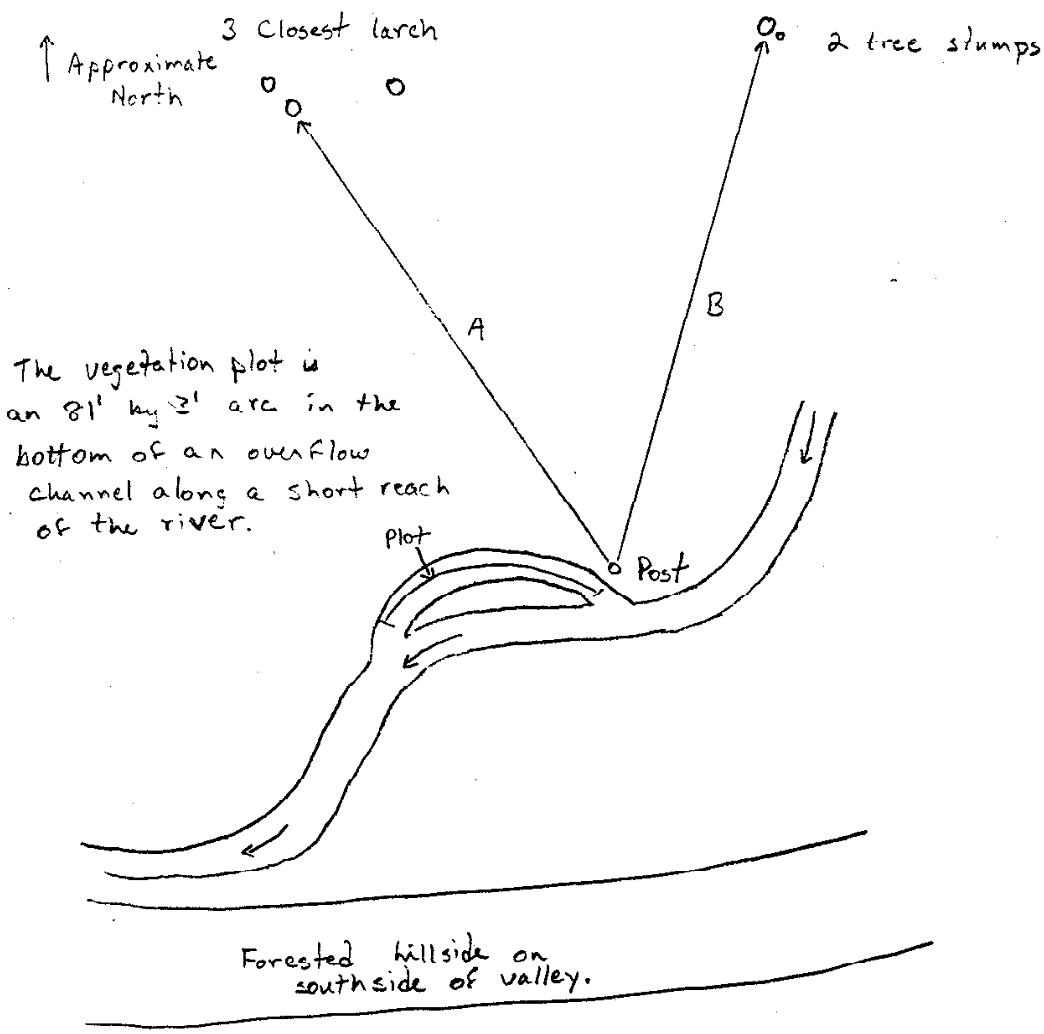
Located in pg 4
Drawn on overlay for 1992 aerial photo #45A 33
GPS location: At the post marking vegetation plot 1.

Vector	Angle (Deg's W. of N.)	Distance (feet)
A	86	NM
B	42	NM

NM = not measured

Woody vegetation summary:

No seedling or sapling, trees or shrubs were observed within the plot.



Photos: 1. From post near upper end of overflow channel. Vadan in left edge of photo. Large larch northwest of plot, beyond part of old hay field. Vector A is from the photo point to the two larch (of the three closest larch with sunshine on their trunks) on the left.

2. From post near upper end of overflow channel. Vadan in overflow channel which is the location of the vegetation transect.

Vegetation Plots 2 & 3

Located in pg 5
Drawn on overlay for 1992 aerial photo #45A 33
GPS location: At post marking vegetation plot 2.

Vector	Angle (Deg's W. of N.)	Distance (feet)
A	335	36.5
B	8	18.4
C	72	25.3
D	90	54.1
E	192	16.6
F	200	16.8
G	218	16.6
H	228	16.5
I	90	51.6
J	180	51.6
K	320	26
L	200	57

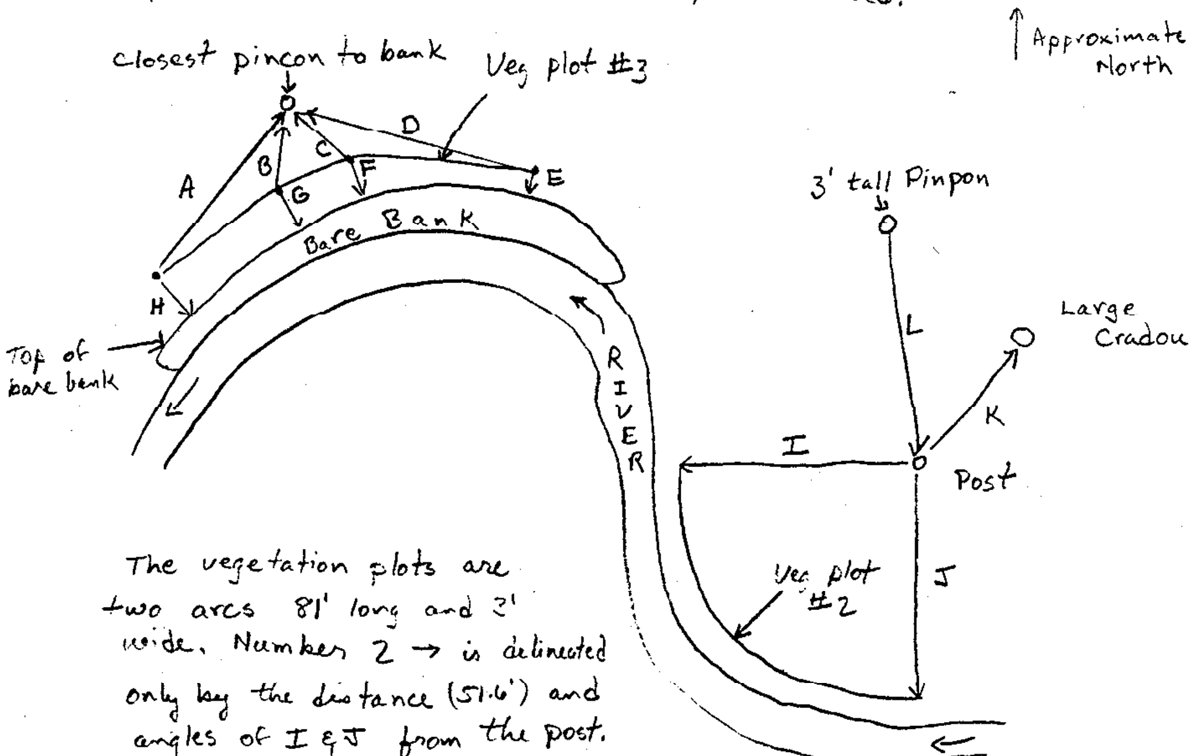
Woody vegetation summaries.

Veg. plot 2: No seedling or sapling, trees or shrubs were observed within the plot.

Veg. plot 3: The following seedling shrubs were observed within the plot:

Rosexx	6	Betgla	8
Symalb	145	Potfru	8
Cradou	27	unidentifiable willows	9

These are the numbers of individual plants observed.



The vegetation plots are two arcs 81' long and 3' wide. Number 2 → is delineated only by the distance (51.6') and angles of I & J from the post. Number 3 is delineated by four pieces of rebar driven into the ground at the intersections of vectors A & H, B & G, C & F, and D & E.

Photos: 1. From southwest of post. Post in foreground. Scott measuring distance to large CRADOU along vector K.

Appendix 2 - GPS Location Information and Cross Section Data

Table of Contents

Introduction

This Appendix contains the GPS location data and the cross section monitoring data. It also contains more detailed descriptions of our methods in collecting, manipulating, and displaying the GPS information and cross section data than the descriptions in the main body of the report.

GPS methods. The GPS location information was collected using a Trimble GeoExplorer II. The raw data for each site consisted of at least 90 consecutive position readings collected in one electronic file. The 90+ readings in each site file were later differentially corrected with analogous base station data from a USFS
were later differentially corrected with analogous base station data from a USFS
Trimble base station in Missoula, MT. The corrected position readings were then averaged electronically to generate one location reading per site.

Two or three site locations were GPS sampled for each cross section, one at or near each rebar peg. The exact rebar location was sampled when an acceptable reading could be obtained. When an acceptable reading could not be obtained due to vegetation canopy, satellite configuration, etc., we moved to a specific cross section distance near the desired location (rebar) and obtained a reading. These alternate locations are given on the cross section maps in Appendix 1.

For a cross section, the corrected and averaged locations were plotted on graph paper. We then used the Pythagorean theorem to determine the distance between the two or three location readings for each cross section. These computed distances were compared to the measured distances along the actual cross section lines. On November 8, 1997 we returned to the project area and recollected the GPS readings for cross sections 1, 2, and 3. We again differentially corrected, averaged and plotted the locations on graph paper. We display below, for each cross section, the set of locations (either the August or November set) which most accurately represents the measured distance between the known GPS locations (considering only the two dimensional measurements of north/south and east/west and not the elevational component.) Readers should understand that these sets of locations, chosen because they most accurately match the known distances, may not in fact accurately represent true locations.

GPS location information. The GPS readings are presented using the UTM system which indicates the location in meters Northing, Easting, and above the WGS-84 ellipsoid.

	Northing	Easting	Elevation
Cross section 1			
RP	5,340,174.6	1,098,790.2	1,009.1
LP	5,340,193.7	1,098,767.6	1,010.3
Cross section 2			
RP	5,338,188.9	1,097,081.6	995.4
MP	5,338,162.6	1,097,118.3	1,002.2
LP	5,338,142.7	1,097,141.8	995.6
Cross section 3			
RP	5,336,471.0	1,093,843.1	983.9
MP	5,336,470.4	1,093,878.0	985.7
LP	5,336,469.4	1,093,918.3	982.3
Cross section 4			
RP	5,335,041.9	1,095,020.4	973.1
LP	5,335,082.3	1,095,053.8	974.4
Vegetation plot 1			
Post	5,337,271.5	1,096,547.5	997.2
Vegetation plot 2			
Post	5,337,124.8	1,095,306.5	991.0
Vegetation plot 3	None, but see the map of plots 2 and 3 in Appendix 1.		

Cross section data display methods. There is a brief location description at the top of the data for each cross section. That is followed by information presented in four columns titled: Distance, Adjusted Reading, Vegetation, and Comments.

The Distances are feet and tenths of feet from the 0.0 ft cross section end at the right peg (RP).

The Adjusted Readings are the ground or channel bottom surface elevation in feet and hundredths of feet in relation to the elevation of the highest end peg (RP or LP, *not the MP*). These readings are generally negative numbers, indicating that the elevations are below the top of the highest peg. In Cross Section 3, there are a few positive elevations, where high spots on a terrace in the middle of the valley bottom are higher than the tops of the pegs towards the edges of the valley bottom.

The entries in the Vegetation column are mostly the six-letter codes of the dominant species in an area of the cross section. A stand of a single species or a group of species begins along the cross section at the distance where their names first appear (going down the column). Those species continue to the distance where the next set of species is recorded. To more exactly record locations, many entries indicate that the mentioned species begin or exist at an intermediate distance between distances at which elevations were recorded. Some Vegetation column entries also state the distance to which species extend when that is not obvious. When a group of species is listed on a line, the individual species are listed in order of decreasing canopy cover.

The Comments column contains information about a variety of features. Most commonly these are indicators of channel or streambank geomorphology. Most entries should be self explanatory. In contrast to the Vegetation information, most of these entries are related only to the distance at which they are recorded. Most do not imply (but some do) that the mentioned physical feature continues to the next entry down the page.

Thompson River Cross Section Data

Cross section 1

Location description. 0.5 miles on road down from Murr Cr. intersection. Near 1st "stand" of conifers on southeast side of road. See 1992 aerial photo #47A 44 and mylar overlay.

Distance	Adjusted Reading	Vegetation	Comments
0	-0.71	Phaaru, Poapra, Ciraiv	top of peg
0	-1.28		ground at peg
2	-1.15		
5	-1.4		
10	-1.27		
12	-1.56		
13	-1.87		
14	-2.51		
14.2	-2.9		
14.3	-4.51	No vegetation	water's edge
15	-4.7		
18	-5.28		
21	-5.29		
24	-5.34		
27	-5.51		
30	-5.4		
33	-5.22		
36	-4.72		
36.8	-4.72	Phaaru, Equarv, Carlan, Caraqu, forbs	water's edge
37	-4.66		
37.2	-4.01		
38	-3.69		
38.9	-3.45		
40	-3.28	from 41.4 unvegetated gravel bar	
43	-2.81		gravel bar
46	-2.68	from 46.3 Phaaru, forbs, Poapra	
49	-2.96		
52	-2.8		
55	-2.84	.....some young willows	
58	-2.72		
61	-2.41	from 60 Alninc, ...at 60.5 Saldru seedling	
64	-2.43	Phaaru, Poapal, Agrsto	
67	-2.3		
70	-2.96		
72	-3.21		
74	-3.89	unknown sedge, no reproductive structures	
75	-4.1		
78	-3.86	Phaaru, Poapal, Poapra, forbs	
78.8	-3.79		
80	-3.3		
82	-2.07		
85	-0.65		
88	-0.7		
91	-0.73		
91.7	-0.63		ground at peg
91.7	0		top of peg

Cross section 2

Location description. 0.25 miles down road from Shroeder Bridge. Look for old exclosure fence in the valley bottom, as shown on photo 3. Use 1992 aerial photo #45A 33 and mylar overlay for finding site.

Distance	Adjusted Reading	Vegetation	Comments
0	-7E-02	Poapra, Cenmac	top of peg
0	-0.39		ground at peg
2	-1.12		
5	-1.99	from 5.0 to 7.0 unvegetated	upper, outside bank of small overflow channel
6	-2.62	at 7.8 seedling Cradou	
8	-3.16	from 9.0 Phaaru	
11	-2.97		
14	-2.45	Agrsto	
17	-2		
20	-1.71		
23	-1.74		
26	-2.16		
29	-1.72		
32	-1.37		
35	-1.03	from 34.0 Poapra, Cenmac	
40	-1.39		
45	-1.28		
50	-1.05		
55	-1.22		
60	-1.07		
65	-1.07	Agrsto, Poapra (through 79.7)	
70	-1.28		
75	-1.19		
77.3	-1.91		upper edge of bank
77.7	-2.45		water's edge
79	-2.8		vegetation growing in water
79.7	-3.19		underwater edge of bank vegetation
80.1	-3.57		gravel bottom
81	-3.84		thalweg
84	-3.56		
86	-3.2		
88.6	-2.4		water's edge
89.0	-1.00	no vegetation, gravel bar	top of gravel bank
90	-1.83		
95	-1.77		
100	-1.61		
105	-1.52		
110	-1.58		
115	-1.89		
115.6	-1.97		
120	-2.34	Phaaru	
125	-2.34		
130	-2.22		
135	-2.17		
140	-2.08	no vegetation, gravel bar	
145	-2.58		water's edge location not recorded on this side of channel
150	-2.97		
155	-4.39		
158	-4.52		
160	-4.01		
162	-2.74		
162.8	-2.28		water's edge
162.9	-1.31	Achmil, Cenmac	top of bank
165	-1.17	Agrsto, Poapra, Achmil	
170	-0.94		

cont. on next page

Cross section 2, cont.

172		middle peg, we mistakenly did not take 'top of peg' or 'ground at peg' elevations.	
175	-0.98	at 179 Cradou sapling	
180	-0.88		
185	-1.42	from 182 to 212 Poapra sparce on gravel	
190	-1.63		
195	-1.51		
200	-1.4		
205	-1.58		
210	-1.67		
215	-1.81	no vegetation, gravel bar	
220	-2.1		
220.8	-2.5		water's edge
224	-3.05	Phaaru clumps across overflow channel, about 30% cover within 0.5m of tape	
227	-3.21		
230	-3.31		
233	-3.09		
236	-3.13		
239.3	-2.5		water's edge
240.3	-2.27		
240.4	-1.1	Poapra	edge of bank
241	-1.08		
244	-1.63	Agrsto	
247	-2.2		
250	-2.39	from 251 to 254 Phaaru	
253	-2.37		
256	-2.28	from 255 unvegetated overflow channel	
259	-1.77		
259.6	-1.55	Agrsto	
263	-0.52	from 262 Poapra, Cenmac	
265	-0.12		
268	-8E-02		
271.7	-0.3		ground at peg
271.7	0		top of peg

Cross section 3

Location description. Can access from roads on both sides of river. Use 1992 aerial photo #44A 31 and mylar overlay for finding site.

Distance	Adjusted Reading	Vegetation	Comments
0	0		top of peg
0	-0.46	Poapra, Symalb, Cenmac	ground at peg
5	-0.66		
10	-0.79	from 9 Cenmac, Linvul, Achmil	
20	-1.35		
25	-1.56		
30	-2.16	from 31 Agrsto, Carmic	
40	-2.79		
50	-2.70		
55	-2.95		
60	-3.41	Phaaru, Scimic	
65	-3.58		
70	-3.64		
72	-3.87		edge of water
74.2	-4.55		vegetation in water
75	-5.23	from 76 open water	
77	-5.48		thalweg
79	-5.24		
81	-4.64		
82	-4.5	Phaaru	vegetation in water
84	-4.09		
85.2	-3.86	Agrsto	water's edge
85.5	-3.15		top of first step of bank
88	-2.31	Potfru through 91	
89.15	-1.27		base of vertical portion of bank
89.4	-0.6		top of vertical portion
92	-5E-02	terrace veg. = Poapra, Phlpra, Agrsto, Cenmac, Symocc, Linvul, Potfru	
97	-3E-02		
102	6E-02		
107	0.3		
112	-1E-02		
117	0.19		
127	7E-02		
128.9	10E-02		ground at middle peg
128.9	0.55		top of peg
135	-9E-02		
140	-0.20		
145	-0.61		
147.5	-1.37		top of undercut bank
147.6	-3.43		in water
150	-3.71		thalweg
155	-3.14		
157.3	-2.73	Agrsto	water's edge
160	-2.5	bare gravel	
162	-2.2	Agrsto	
165	-2.49		
166	-2.56	from 167 Potfru, Agrsto	
169	-1.55		
175	-1.60		
180	-1.72		
185	-1.82	from 186 to 192 Scimic, Agrsto	
190	-2.33	.....at 191 small amount of Phaaru	
192.9	-2.65		water's edge - westside of main channel
192.95	-4.23		slope toe of steep bank in channel

cont. on next page

Cross section 3, cont.

195	-4.55		
198	-4.4		
200	-4.19		
202	-3.94		on cobble
204	-4.1		
206	-4.01		
208	-3.9		
210	-3.72		
212	-3.44		on cobble
214	-3.59		
216	-3.37		
218	-3.45		
220	-3.44		
222	-3.51		
224	-3.59		
226	-3.8		(water's edge was not recorded for this side)
228	-4.05		
229.25	-3.96	from 229 Scimic, Agrsto, some Phaaru	slope toe of east channel bank
229.45	-2.49		top of first edge of upper bank
230	-2.15		on bank
232	-1.96		
234	-1.85		
235	-1.89	from 236 Agrsto	
245	-2.33		
250	-2.31		overflow channel
255	-2.32	from 253 Phaaru	
257	-2.64		
259	-2.92		main part of overflow channel
261	-2.92	from 260 Poapal, Agrsto	
262	-2.99		
263	-2.99		
266	-2.68		
267	-2.34		
267.95	-2.15	Poapra, Agrsto, Cirarv, Potgra	slope toe of east bank of overflow channel
268.15	-1.68		top of first part of upper bank
269	-1.52		
271	-1.54		
273	-1.04		
275	-0.9		
275.5	-0.9		ground at peg
275.5	-0.49		top of peg

Cross section 4

Location description. Access is easiest from small spur road northeast of river. Use 1992 aerial photo #44A 30 and mylar overlay for finding site.

Distance	Adjusted Reading	Vegetation	Comments
0	-3.85		top of peg
0	-4.34	Poapra, forbs, Agrsto	ground at peg
5	-4.26		
10	-4.16		
15	-4.31		
20	-5.1	from 17 Salboo, Saldru both small	
25	-5.13	from 23 Scimic, Poapal	
30	-4.47	from 28 Cradou, Alninc both small	
33.1	-4.91	Poapal, Equarv	upper part of west bank
34	-6.02	water, no vegetation	water's edge
34.5	-7.51		underwater slope toe of west bank
35	-7.5		
37	-7		
39	-6.83		
41	-7		
43	-6.99		on cobble
45	-7.16		
47	-7.11		on cobble
49	-7.17		
51	-7.21		
53	-7.45		
55	-7.58		
57	-7.8		
59	-7.88		
61	-7.7		
63	-7.59		
65	-7.62		
67	-7.45		
69	-7.21		
71	-6.69		
73.1	-6.09		water's edge
74	-5.89	no vegetation, gravel bar	
79	-5.64	81.6 to 84.0 Phaaru	
84	-5.44	no vegetation, gravel bar	
89	-5.62		
90	-5.56	Agrsto, Carmic, Phaaru, Junens, Artlud, Poapra	
95	-5.46		
100	-5.14		
105	-4.75		
110	-4.9		
115	-4.97		
120	-5.04		
125	-5.24		
128	-5.6		
130	-6	no vegetation	top edge of bank
130.9	-7.47		slope toe in channel bottom
132	-7.76		(water's edge between 130.0 & 130.9)
134	-7.58		
136	-7.38		
138	-7.06		
139.15	-6.91	unknown sedge	slope toe in channel bottom
139.5	-6.29		water's edge
140	-5.8		
142	-5.3		
145	-4.54	Agrsto, some unknown sedges	
150	-4.44	Alninc, Corsto	
155	-4.36	from 156 Agrsto, Poapra	
160	-2.85		
165	-1.74	Symalb, Poapra	
170	-0.74		
171	-0.54		ground at peg
171	0		top of peg

Riparian vegetation types and their abbreviations recorded for the project

The habitat and community types are named and described in Hansen and others (1995). The dominance types are named following conventions described in that same document. Within the lifeform groups below (trees, shrubs, and graminoids), the types are listed in approximate order of decreasing occurrence within the project area.

Abbreviation	Type
Tree Types	
Psemen/Corsto HT	*Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) Habitat Type
Picea/Calcan CT	*Picea/Calamagrostis canadensis* (spruce/bluejoint reedgrass) Community Type
Picea/Equarv HT	*Picea/Equisetum arvense* (spruce/field horsetail) Habitat Type
Poptre/Corsto HT	*Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) Habitat Type
Pincon DT	*Pinus contorta* (lodgepole pine) Dominance Type
Shrub Types	
Crasuc CT	*Crataegus succulenta* (succulent hawthorn) Community Type
Alninc CT	*Alnus incana* (mountain alder) Community Type
Saldru/Carros HT	*Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) Habitat Type
Salgey/Carros HT	*Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) Habitat Type
Potfru/Desces HT	*Potentilla fruticosa/Deschampsia cespitosa* (shrubby cinquefoil/tufted hairgrass) Habitat Type
Symocc CT	*Symphoricarpos occidentalis* (western snowberry) Community Type
Betgla/Carros HT	*Betula glandulosa/Carex rostrata* (bog birch/beaked sedge) Habitat Type
Corsto CT	*Cornus stolonifera* (red-osier dogwood) Community Type
Saldru CT	*Salix drummondiana* (Drummond willow) Community Type

Graminoid Types

Phaaru HT	*Phalaris arundinacea* (reed canarygrass) Habitat Type
Alopra DT	*Alopecurus pratensis* (meadow foxtail) Dominance Type
Poapra CT	*Poa pratensis* (Kentucky bluegrass) Community Type
Phlpra DT	*Phleum pratense* (common timothy) Dominance Type
Agrsto CT	*Agrostis stolonifera* (redtop) Community Type
Agrrep DT	*Agropyron repens* (quackgrass) Dominance Type
Carros/Carros HT	*Carex rostrata* (beaked sedge) Habitat Type *Carex rostrata* (beaked sedge) Phase
Carlas HT	*Carex lasiocarpa* (slender sedge) Habitat Type
Elepal HT	*Eleocharis palustris* (common spikesedge) Habitat Type
Junbal CT	*Juncus balticus* (Baltic rush) Community Type
Broine CT	*Bromus inermis* (smooth brome) Community Type
Poacom DT	*Poa compressa* (Canada bluegrass) Dominance Type

Plant species and their six-letter codes recorded for the project

The common names, scientific names, and 6-letter codes follow the USDA Forest Service Northern Region's ECODATA (1989) vegetation analysis program.

Common Name (*Scientific Name*)	Six-Letter Code
Trees	
Elaeagnus angustifolia (Russian olive)	ELAANG
Larix occidentalis (western larch)	LAROCC
Picea spp. (spruce)	PICEAX
Pinus contorta (lodgepole pine)	PINCON
Pinus ponderosa (ponderosa pine)	PINPON
Pseudotsuga menziesii (Douglas fir)	PSEMEN
Shrubs	
Alnus incana (mountain alder)	ALNINC
Amelanchier alnifolia (western serviceberry)	AMEALN
Arctostaphylos uva-ursi (kinnikinnick)	ARCUVA
Betula glandulosa (bog birch)	BETGLA
Cornus stolonifera (red-osier dogwood)	CORSTO
Crataegus douglasii (black hawthorn)	CRADOU
Potentilla fruticosa (shrubby cinquefoil)	POTFRU
Rhamnus alnifolia (alder buckthorn)	RHAALN
Rosa spp. (rose)	ROSAXX
Rosa nutkana (bristly Nootka rose)	ROSNUT
Salix bebbiana (Bebb willow)	SALBEB
Salix boothii (Booth willow)	SALBOO
Salix drummondiana (Drummond willow)	SALDRU
Salix geyeriana (Geyer willow)	SALGEY
Shepherdia canadensis (Canadian buffaloberry)	SHECAN
Spiraea betulifolia (shiny-leaf spiraea)	SPIBET
Symphoricarpos albus (common snowberry)	SYMALB
Graminoids	
Agrostis stolonifera (redtop)	AGRSTO
Alopecurus pratensis (meadow foxtail)	ALOPRA
Calamagrostis canadensis (bluejoint reedgrass)	CALCAN
Carex hoodii (Hood's sedge)	CARHOO
Carex lanuginosa (woolly sedge)	CARLAN
Carex lenticularis (lentil-fruited sedge)	CARLEN

Carex microptera (small-winged sedge)	CARMIC
Carex rostrata (beaked sedge)	CARROS
Carex sartwellii (Sartwell's sedge)	CARSAR
Eleocharis palustris (common spikesedge)	ELEPAL
Elymus glaucus (blue wildrye)	ELYGLA
Glyceria grandis (American mannagrass)	GLYGRA
Glyceria striata (fowl mannagrass)	GLYSTR
Juncus balticus (Baltic rush)	JUNBAL
Juncus tenuis (slender rush)	JUNTEN
Phalaris arundinacea (reed canarygrass)	PHAARU
Phleum pratense (common timothy)	PHLPRA
Poa compressa (Canada bluegrass)	POACOM
Poa palustris (fowl bluegrass)	POAPAL
Poa pratensis (Kentucky bluegrass)	POAPRA
Scirpus microcarpus (small-flowered bulrush)	SCIMIC
Forbs	
Achillea millefolium (common yarrow)	ACHMIL
Actaea rubra (baneberry)	ACTRUB
Angelica arguta (sharptooth angelica)	ANGARG
Aster occidentalis (western aster)	ASTOCC
Athyrium filix-femina (ladyfern)	ATHFIL
Campanula rotundifolia (harebell)	CAMROT
Centaurea maculosa (spotted knapweed)	CENMAC
Cicuta douglasii (Douglas water-hemlock)	CICDOU
Cirsium arvense (Canada thistle)	CIRARV
Cynoglossum officinale (common hound's-tongue)	CYNOFF
Equisetum arvense (field horsetail)	EQUARV
Equisetum hyemale (common scouring rush)	EQUHYE
Fragaria virginiana (Virginia strawberry)	FRAVIR
Galium boreale (sweetscented bedstraw)	GALBOR
Heracleum lanatum (cow-parsnip)	HERLAN
Hieracium aurantiacum (orange hawkweed)	HIEAUR
Hieracium pratense (yellow hawkweed)	HIEPRA
Linaria vulgaris (butter and eggs)	LINVUL
Medicago lupulina (black medic)	MEDLUP
Mentha arvensis (field mint)	MENARV
Penstemon confertus (yellow penstemon)	PENCON
Penstemon procerus (small-flowered penstemon)	PENPRO
Petasites sagittatus (arrowleaf coltsfoot)	PETSAG
Polygonum amphibium (water smartweed)	POLAMP
Potentilla anserina (common silverweed)	POTANS

Potentilla gracilis (slender cinquefoil)	POTGRA
Potentilla recta (sulphur cinquefoil)	POTREC
Prunella vulgaris (self-heal)	PRUVUL
Rumex acetosa (meadow sorrel)	RUMACT
Senecio foetidus (sweet-marsh butterweed)	SENFOE
Senecio hydrophilus (alkali-marsh butterweed)	SENHYD
Taraxacum spp. (dandelion)	TARAXA
Thalictrum occidentale (western meadowrue)	THAOCC
Trifolium spp. (clover)	TRIFOL
Trifolium repens (white clover)	TRIREP
Urtica dioica (stinging nettle)	URTDIO
Zigadenus elegans (glaucous zigadenus)	ZIGELE

Appendix 4 - Riparian Reconnaissance Field Data

The reconnaissance of the eight polygons was performed on July 12 and July 13. The field form information is shown on the following sixteen pages (two pages per polygon). Plant species are named using six-letter codes, and vegetative types are named using modified six-letter code abbreviations. The species, types and their abbreviations are presented in Appendix 3.

Percent estimates of the polygon (for the vegetation types) and of the stream length (for the stream types) were recorded as class codes. We used the following class codes and ranges to record those ocularly estimated percents:

T = 0.1<1%	2 = 15<25%	5 = 45<55%	8 = 75<85%
P = 1<5%	3 = 25<35%	6 = 55<65%	9 = 85<95%
1 = 5<15%	4 = 35<45%	7 = 65<75%	F = 95-100%

The functioning assessment shown on the second page of each set of polygon information, follows BLM national guidelines as outlined in BLM publication TR 1737-9 1993. We slightly modified that procedure in that we at times recorded both Yes and No responses for a characteristic. In those cases, we felt that there were sufficient parts of the polygon which warranted each responses. For example, most point bars (item 14) in each polygon were vegetated or revegetating. At the same time, some polygons had a significant number of point bars which were bare. Since a primary goal of this complete exercise is to provide PCTC with an overview of their land, and to allow them to monitor future changes, it seems reasonable to provide insight with both responses. In contrast a single response, when both situations are common, would be misleading.

1997 Thompson River Riparian Reconnaissance Field Form

Polygon *1a* Observer(s) *JP, SLM* Date *July 12*

Vegetation Information

Vegetation Types	Percent of Polygon
Phaaru HT	*5*
Crasuc CT	*3*
Alninc CT	*1*
Poapra CT	*P*
Psemen/Corsto HT	*P*
Potfru/Desces HT	*T*
Betgla/Carros HT	*T*
Piceax/Calcan HT	*T*
Salgey Carros HT	*T*
&	*&*
&	*&*

Other common or important species observed

Trees	Shrubs	Graminoids	Forbs
Pincon	*Salboo*	*Phlpra*	*Achmil*
&	*Rosaxx*	*Carmic*	*Taraxa*
&	*Cradou*	*Alopra*	*Senhyd*
&	*&*	*Scimic*	*Camrot*
&	*&*	*Calcan*	*Petsag*
&	*&*	*&*	*Herlan*
&	*&*	*&*	*Zigele*
&	*&*	*&*	*&*
&	*&*	*&*	*&*
&	*&*	*&*	*&*

Noxious weeds observed *Cynoff* *Cenmac*

Cirarv *Urtdio* *&*

Polygon Size, Channel, and Riparian Functioning Information

Average Riparian-Wetland Zone Width (ft) *550*

Riparian-Wetland Zone Width Range (ft) *50* to *750*

Rosgen stream geomorphology types and percents

B4 - 4	*E4 - 1*	*F4 - 1*	*C4 - 4*
			& - &

BLM Standard Checklist for assessing functioning condition

Yes	No	N/A		Hydrologic
Y			1	Floodplain inundation
	N		2	Active/stable beaver dams
Y			3	Sinuosity, W/D, and gradient in balance with landscape.
Y			4	Riparian zone width
	N		5	Upland not contributing to riparian degradation
				Vegetative
Y	*N*		6	Diverse age-class distribution
Y	*N*		7	Diverse composition
Y			8	Species indicate maintenance soil moisture
Y			9	Root mass bank protection
Y			10	Riparian vegetation vigor
Y			11	Vegetative cover protects banks and dissipates energy
	N		12	Adequate woody debris sources
				Soils, Erosion, Deposition
Y			13	Adequate dissipation of flood energies
Y	*N*		14	Point bars are revegetating
Y			15	Lateral stream movement is part of natural sinuosity
Y	*N*		16	System is vertically stable
	N		17	Stream in balance with supplied water and sediment

Functional Rating: (PFC, Functional-At Risk, or Nonfunctional) *Functional-At Risk*

Trend for Functional-At Risk: (Upward, Downward, or Not Apparent) *Not Apparent*

Are outside factors influencing the condition: (Yes or No) *Yes* If yes, what are they? *There was a major flood event this spring which brought an extreme amount of gravels into the Thompson River from Murr Creek. That sediment is deposited throughout this reach, both within the channel and outside of it on the floodplain. In places, the gravel has filled the channel so much that the current water level appears higher than the bankfull level of years past. The channel filling appears also to have caused excessive erosion on some channel banks, which previously were probably portions of the floodplain rather than being part of the bank.*

Comments: *See the previous comment. In relation to the situation with the deposited gravels, I have recorded the trend as not being apparent. The decreased functioning due to the deposited gravels is probably more than offset by the increased functioning due to the apparent fencing of livestock from the area (see the cattle impact review by Brian Sugden, 1995), but that is not certain.*

1997 Thompson River Riparian Reconnaissance Field Form

Polygon *1b* Observer(s) *JP, SLM* Date *July 12*

Vegetation Information

Vegetation Types	Percent of Polygon
Phaaru HT	5
Salgey/Carros HT	2
Crasuc CT	2
Saldru/Carros HT	1
Alninc CT	P
Picea/Equarv HT	T
Potfru/Desces HT	T
Psemen/Corsto HT	T
&	&
&	&
&	&

Other common or important species observed

Trees	Shrubs	Graminoids	Forbs
Pincon	*Rhaaln*	*Carmic*	*Achmil*
Larocc	*Betocc*	*Phlpra*	*Taraxa*
&	*Symalb*	*Calcan*	*Trifol*
&	*Rosaxx*	*Elyglu*	*Galbor*
&	*Salboo*	&	*Senhyd*
&	*Cradou*	&	*Camrot*
&	&	&	*Fravir*
&	&	&	*Actrub*
&	&	&	&
&	&	&	&

Noxious weeds observed *Cirarv* *Cenmac*
Cynoff *Urtdio* &

Polygon Size, Channel, and Riparian Functioning Information

Average Riparian-Wetland Zone Width (ft) *500*
Riparian-Wetland Zone Width Range (ft) *100* to *700*

Rosgen stream geomorphology types and percents C4 - 6

D4 - 2	E4 - 2	F4 - T	& - &

BLM Standard Checklist for assessing functioning condition

Yes	No	N/A		Hydrologic
Y			1	Floodplain inundation
	N		2	Active/stable beaver dams
Y			3	Sinuosity, W/D, and gradient in balance with landscape.
Y			4	Riparian zone width
	N		5	Upland not contributing to riparian degradation
				Vegetative
Y			6	Diverse age-class distribution
Y	N		7	Diverse composition
Y			8	Species indicate maintenance soil moisture
Y			9	Root mass bank protection
Y			10	Riparian vegetation vigor
Y			11	Vegetative cover protects banks and dissipates energy
	N		12	Adequate woody debris sources
				Soils, Erosion, Deposition
Y			13	Adequate dissipation of flood energies
Y			14	Point bars are revegetating
Y			15	Lateral stream movement is part of natural sinuosity
Y			16	System is vertically stable
Y	N		17	Stream in balance with supplied water and sediment

Functional Rating: (PFC, Functional-At Risk, or Nonfunctional) *PFC*

Trend for Functional-At Risk: (Upward, Downward, or Not Apparent)

Are outside factors influencing the condition: (Yes or No) *Y* If yes, what are they? ***As in polygon 1a, there was significant deposition of gravel and small cobble sized materials in this polygon. The amount of deposition, and its effects on the functioning of the system appear to be much less here than in 1a. The riparian area and channel are in Proper Functioning Condition (PFC).***

Comments: *&*

1997 Thompson River Riparian Reconnaissance Field Form

Polygon *2* Observer(s) *JP, SLM* Date *July 12*

Vegetation Information

Vegetation Types	Percent of Polygon
Crasuc CT	*5*
Phaaru HT	*4*
Psemen/Corsto HT	*T*
&	*&*
&	*&*
&	*&*
&	*&*
&	*&*
&	*&*
&	*&*
&	*&*

Other common or important species observed

Trees	Shrubs	Graminoids	Forbs
Pinpon	*Alninc*	*Poapra*	*Menarv*
Pincon	*Saldru*	*Phlpra*	*Taraxa*
&	*Salgey*	*Scimic*	*Senhyd*
&	*Corsto*	*Carhoo*	*Angarg*
&	*Rosnut*	*Carlen*	*Achmil*
&	*Symalb*	*Poapal*	*Equarv*
&	*Rosaxx*	*&*	*Equhym*
&	*Cradou*	*&*	*&*
&	*&*	*&*	*&*
&	*&*	*&*	*&*

Noxious weeds observed *None* *&*
& *&* *&*

Polygon Size, Channel, and Riparian Functioning Information

Average Riparian-Wetland Zone Width (ft) *100*
Riparian-Wetland Zone Width Range (ft) *40* to *350*

Rosgen stream geomorphology types and percents

C4 - 2	*F4 - 2*	*D4 - 1*	*B4 - 5*
			& - &

BLM Standard Checklist for assessing functioning condition

Yes	No	N/A	Hydrologic	
Y			1	Floodplain inundation
	N		2	Active/stable beaver dams
Y			3	Sinuosity, W/D, and gradient in balance with landscape.
Y			4	Riparian zone width
	N		5	Upland not contributing to riparian degradation
			Vegetative	
	N		6	Diverse age-class distribution
Y	*N*		7	Diverse composition
Y			8	Species indicate maintenance soil moisture
Y			9	Root mass bank protection
Y			10	Riparian vegetation vigor
Y	*N*		11	Vegetative cover protects banks and dissipates energy
	N		12	Adequate woody debris sources
			Soils, Erosion, Deposition	
Y	*N*		13	Adequate dissipation of flood energies
Y	*N*		14	Point bars are revegetating
Y			15	Lateral stream movement is part of natural sinuosity
	N		16	System is vertically stable
	N		17	Stream in balance with supplied water and sediment

Functional Rating: (PFC, Functional-At Risk, or Nonfunctional) *Functional-At Risk*
Trend for Functional-At Risk: (Upward, Downward, or Not Apparent) *Not Apparent*
Are outside factors influencing the condition: (Yes or No) *Yes* If yes, what are they? *Again the gravel and cobble deposition was significant in parts of this reach. At least one bank appears to have been highly degraded in an area with extensive deposition. Many banks in this reach are poorly vegetated and made of uncohesive sands and gravels. These are susceptible to damage by high flows, but also have the potential for increased stability with increased vegetative cover.*

Comments: *Some of the unstable banks are potential sites for planting woody vegetation. On the drier of those sites, which have gravelly/sandy banks, the planting should be done in the fall or early spring, to allow spring and early summer root growth before the bank materials dry out.*

1997 Thompson River Riparian Reconnaissance Field Form

Polygon 3 Observer(s) *JP, SLM* Date *July 13*

Vegetation Information

Vegetation Types	Percent of Polygon
Phaaru HT	5
Agrsto CT	1
Poapra CT	1
Agrrep DT	1
Alopra DT	1
Phlpra DT	1
Crasuc CT	P
Upland Vegetation Types	P
Poacom DT	T
&	&
&	&

Other common or important species observed

Trees	Shrubs	Graminoids	Forbs
Psemen	*Alninc*	*Carmic*	*Taraxa*
Pinpon	*Betgla*	*Junbal*	*Menarv*
Pincon	*Cradou*	*Scimic*	*Equarv*
Elaang	&	&	*Achmil*
&	&	&	&
&	&	&	&
&	&	&	&
&	&	&	&
&	&	&	&
&	&	&	&

Noxious weeds observed *Cenmac* *Cirarv*
Linvul Potrec *Cynoff*

Polygon Size, Channel, and Riparian Functioning Information

Average Riparian-Wetland Zone Width (ft) *400*
Riparian-Wetland Zone Width Range (ft) *30* to *600*

Rosgen stream geomorphology types and percents

B4 - 2	*C4 - 1*	*& - &*	*D4 - 7*
			& - &

BLM Standard Checklist for assessing functioning condition

Yes	No	N/A	Hydrologic	
Y			1	Floodplain inundation
	N		2	Active/stable beaver dams
	N		3	Sinuosity, W/D, and gradient in balance with landscape.
Y			4	Riparian zone width
	N		5	Upland not contributing to riparian degradation
			Vegetative	
	N		6	Diverse age-class distribution
	N		7	Diverse composition
Y			8	Species indicate maintenance soil moisture
Y			9	Root mass bank protection
Y			10	Riparian vegetation vigor
Y	*N*		11	Vegetative cover protects banks and dissipates energy
	N		12	Adequate woody debris sources
			Soils, Erosion, Deposition	
Y			13	Adequate dissipation of flood energies
Y	*N*		14	Point bars are revegetating
Y			15	Lateral stream movement is part of natural sinuosity
Y	*N*		16	System is vertically stable
	N		17	Stream in balance with supplied water and sediment

Functional Rating: (PFC, Functional-At Risk, or Nonfunctional) *Functional-At Risk*

Trend for Functional-At Risk: (Upward, Downward, or Not Apparent) *Not Apparent*

Are outside factors influencing the condition: (Yes or No) *Yes* If yes, what are they? ***Again there is significant deposition of the gravels and cobbles in this area. As is commonly the case, that deposition is most common in areas with braided channels. With deposition there can be increased stress on the banks, causing increased braiding. Some areas appear to be on a downward trend in that cycle, because of the deposition. Other areas appeared to be either stable or on an upward trend.***

Comments: ***The Elaang recorded appears to be planted. It is in an old exclosure at the low end of the first braided reach going down through the polygon. There are about a half dozen plants. They are quite small and do not appear to be highly vigorous.***

There is a high potential for beneficial effects of planting woody vegetation in this polygon. There are many areas with bare banks, especially in the braided reaches. Most of the bare banks are on side channels. Phaaru will probably colonize those banks in the next few years, resulting in reduced chances of natural woody plant establishment. If planting is to be done, it should be sooner, rather than later.

1997 Thompson River Riparian Reconnaissance Field Form

Polygon *4* Observer(s) *JP, SLM* Date *July 13*

Vegetation Information

Vegetation Types	Percent of Polygon
Phaaru HT	*5*
Alopra DT	*4*
Phlpra DT	*P*
Picea/Equarv HT	*T*
Crasuc CT	*T*
Broine CT	*T*
Poapra CT	*T*
&	*&*
&	*&*
&	*&*
&	*&*

Other common or important species observed

Trees	Shrubs	Graminoids	Forbs
Pincon	*Alninc*	*Carmic*	*Menarv*
Psemen	*Rosaxx*	*Scimic*	*Senhyd*
Larocc	*Symalb*	*Poacom*	*Equarv*
&	*Shecan*	*&*	*Pruvul*
&	*Spibet*	*&*	*Achmil*
&	*Cradou*	*&*	*Taraxa*
&	*&*	*&*	*Medlup*
&	*&*	*&*	*Fravir*
&	*&*	*&*	*Pencon*
&	*&*	*&*	*Trirep*

Noxious weeds observed *Cenmac* *Cirarv*
Hieaur *&* *&*

Polygon Size, Channel, and Riparian Functioning Information

Average Riparian-Wetland Zone Width (ft) *400*
Riparian-Wetland Zone Width Range (ft) *300* to *500*

Rosgen stream geomorphology types and percents

B4 - 1	*F4 - 1*	*D4 - 1*	*E4 - 7*
			& - &

BLM Standard Checklist for assessing functioning condition

Yes	No	N/A	Hydrologic	
Y			1	Floodplain inundation
	N		2	Active/stable beaver dams
Y			3	Sinuosity, W/D, and gradient in balance with landscape.
Y			4	Riparian zone width
Y	*N*		5	Upland not contributing to riparian degradation
			Vegetative	
	N		6	Diverse age-class distribution
	N		7	Diverse composition
Y			8	Species indicate maintenance soil moisture
Y			9	Root mass bank protection
Y			10	Riparian vegetation vigor
Y	*N*		11	Vegetative cover protects banks and dissipates energy
	N		12	Adequate woody debris sources
			Soils, Erosion, Deposition	
Y			13	Adequate dissipation of flood energies
Y			14	Point bars are revegetating
Y			15	Lateral stream movement is part of natural sinuosity
Y			16	System is vertically stable
Y			17	Stream in balance with supplied water and sediment

Functional Rating: (PFC, Functional-At Risk, or Nonfunctional) *PFC*
Trend for Functional-At Risk: (Upward, Downward, or Not Apparent)
Are outside factors influencing the condition: (Yes or No) *Yes* If yes, what are they? ***Deposited gravels from the large runoff event this spring are noticeable, but not common in this polygon. There is little apparent effect here on the functioning of the systems by those gravels. For the most part, the gravels apparently moved through the E4 channels with little deposition or degradation. That follows theory, as E channels, despite their appearance at low flows, are very efficient at moving sediment during high flows.***

Comments: ***The "No" responses to #'s 6 and 7 in the functioning assessment are based on a comparison of the present vegetation to the potential vegetation for the area. The three planted hay species PHAARU, ALOPRA, and PHLPRA dominate this area. Besides being common, they grow so densely that they almost can eliminate the chance for other species to become established. Despite this situation, I am calling the functioning condition as PFC. Those planted species provide significant stability. Bank damage due to the apparent high flows appears to be limited to some bank undercutting. That undercutting is within the limits (in my opinion) of the natural dynamics of this channel/riparian system when it is functioning properly.***

1997 Thompson River Riparian Reconnaissance Field Form

Polygon *5* Observer(s) *JP, SLM* Date *July 12*

Vegetation Information

Vegetation Types	Percent of Polygon
Phaaru HT	*4*
Crasuc CT	*2*
Polfru/Desces HT	*1*
Saldru/Carros HT	*1*
Salgey/Carros HT	*1*
Alopra DT	*1*
Carros/Carros HT	*P*
Poapra CT	*P*
Poptre/Corsto HT	*T*
Betgla/Carros HT	*T*
Pincon DT	*T*
Symocc CT	*T*
Junbal CT	*T*

Other common or important species observed

Trees	Shrubs	Graminoids	Forbs
Pincon	*Symalb*	*Carmic*	*Polamp*
Psemen	*Rosaxx*	*Broine*	*Menarv*
&	*Cradou*	*Phlpra*	*Potans*
&	*&*	*&*	*Penpro*
&	*&*	*&*	*Rumact*
&	*&*	*&*	*Taraxa*
&	*&*	*&*	*Trifol*
&	*&*	*&*	*&*
&	*&*	*&*	*&*
&	*&*	*&*	*&*

Noxious weeds observed *Cenmac* *Cirarv*

Cynoff *Urtdio* *&*

Polygon Size, Channel, and Riparian Functioning Information

Average Riparian-Wetland Zone Width (ft) *500*

Riparian-Wetland Zone Width Range (ft) *70* to *600*

Rosgen stream geomorphology types and percents

E4 - 2	*C6 - P*	*B4 - P*	*E6 - 7*
			& &

BLM Standard Checklist for assessing functioning condition

Yes	No	N/A	Hydrologic	
Y			1	Floodplain inundation
	N		2	Active/stable beaver dams
Y			3	Sinuosity, W/D, and gradient in balance with landscape.
Y			4	Riparian zone width
Y			5	Upland not contributing to riparian degradation
			Vegetative	
Y	*N*		6	Diverse age-class distribution
Y			7	Diverse composition
Y			8	Species indicate maintenance soil moisture
Y			9	Root mass bank protection
Y			10	Riparian vegetation vigor
Y			11	Vegetative cover protects banks and dissipates energy
	N		12	Adequate woody debris sources
			Soils, Erosion, Deposition	
Y			13	Adequate dissipation of flood energies
Y			14	Point bars are revegetating
Y			15	Lateral stream movement is part of natural sinuosity
Y			16	System is vertically stable
Y			17	Stream in balance with supplied water and sediment

Functional Rating: (PFC, Functional-At Risk, or Nonfunctional) *PFC*
Trend for Functional-At Risk: (Upward, Downward, or Not Apparent) *&*
Are outside factors influencing the condition: (Yes or No) *No* If yes, what are they? *There is a very limited amount of recently deposited gravels in this polygon. Those present do not appear to be effecting the functioning of the system.*

Comments: *The channel is quite stable in this reach. We saw three or four ~50' reaches with bare banks. These are generally on slightly higher terraces than most banks. Historical grazing on these locations has kept the the vegetation sparse and as a consequence the adjacent banks are not as stable as they could be. Vegetation plot 3 is an example of one of these higher, drier, and more impacted banks. Despite these few bare banks, the overall condition of the area is PFC.*

1997 Thompson River Riparian Reconnaissance Field Form

Polygon *6* Observer(s) *JP, SLM* Date *July 12*

Vegetation Information

Vegetation Types	Percent of Polygon
Crasuc CT	*7*
Potfru/Desces HT	*1*
Phaaru HT	*1*
Psemen/Corsto HT	*P*
Saldru/Carros HT	*T*
Carros/Carros HT	*T*
Carlas HT	*T*
Corsto CT	*T*
Saldru CT	*T*
Symocc CT	*T*
Agrsto CT	*T*
Poapra CT	*T*

Other common or important species observed

Trees	Shrubs	Graminoids	Forbs
Psemen	*Rhaaln*	*Elygla*	*Thalic*
Pincon	*Salbeb*	*Calcan*	*Athfil*
Piceax	*Alninc*	*Glygra*	*Angarg*
&	*Salboo*	*Glystr*	*Equarv*
&	*Amealn*	*Carmic*	*Trifol*
&	*Symalb*	*Junbal*	*Achmil*
&	*Rosaxx*	*Scimic*	*Taraxa*
&	*Cradou*	*Phlpra*	*Potgra*
&	*&*	*Junten*	*Senfoe*
&	*&*	*Carsar*	*Rumact*

Noxious weeds observed *Cenmac* *Cirarv*
Hiepra *Cynoff*

Polygon Size, Channel, and Riparian Functioning Information

Average Riparian-Wetland Zone Width (ft) *300*
Riparian-Wetland Zone Width Range (ft) *50* to *500*

Rosgen stream geomorphology types and percents *B4 - 5*

D4 - 3 *C4 - 2* *B3 - T* *F4 - T*

BLM Standard Checklist for assessing functioning condition

Yes	No	N/A	Hydrologic	
Y			1	Floodplain inundation
	N		2	Active/stable beaver dams
Y	*N*		3	Sinuosity, W/D, and gradient in balance with landscape.
Y			4	Riparian zone width
Y			5	Upland not contributing to riparian degradation
			Vegetative	
Y	*N*		6	Diverse age-class distribution
Y			7	Diverse composition
Y			8	Species indicate maintenance soil moisture
Y	*N*		9	Root mass bank protection
Y			10	Riparian vegetation vigor
Y	*N*		11	Vegetative cover protects banks and dissipates energy
Y	*N*		12	Adequate woody debris sources
			Soils, Erosion, Deposition	
Y			13	Adequate dissipation of flood energies
Y	*N*		14	Point bars are revegetating
Y	*N*		15	Lateral stream movement is part of natural sinuosity
Y			16	System is vertically stable
Y			17	Stream in balance with supplied water and sediment

Functional Rating: (PFC, Functional-At Risk, or Nonfunctional) *Functional-At Risk*
Trend for Functional-At Risk: (Upward, Downward, or Not Apparent) *Upward*
Are outside factors influencing the condition: (Yes or No) *Yes* If yes, what are they? *A small amount of deposited gravels, with very little impact. The reply is only marginally yes.*

Comments: *Many banks are vegetated with shallowly rooted species. In places, the banks are composed of a thin, upper soil layer, with some binding plant roots, covering a thick gravel and sand layer, with few roots. In exposed banks, these lower gravels and sands can wash out from underneath the thin soil/root layer during high flows. That top layer then will lay down on the remaining gravels and sands, and usually it will be washed away. Periodically, after being undercut, the plants in the upper layer will reroot into the lower layer, forming a bank which is moderately sloped with some stability. The upward trend is speculative, since we have not seen this area before. There is evidence of significant historic grazing. We are speculating that if that grazing has in fact been removed, or at least decreased, the area is probably on an upward trend.*

Note: *The riparian widths and vegetation types, for this polygon, are reflective only of the riparian area associated with the main channel throughout the polygon. There are also riparian areas in the lower half of the west side of the polygon associated with water from entering tributaries and springs which we did not consider in the widths and types list. We changed our thinking on how to properly deal with these situations and we intended to reevaluate these widths and types, considering all riparian areas in the valley bottom. Unfortunately, we forgot to do that, and these data are somewhat incorrect. We considered the complete valley bottom when collecting data for all other polygons.*

1997 Thompson River Riparian Reconnaissance Field Form

Polygon *7* Observer(s) *JP, SLM* Date *July 13*

Vegetation Information

Vegetation Types	Percent of Polygon
Alninc CT	*6*
Saldru/Carros HT	*2*
Crasuc CT	*1*
Potfru/Desces HT	*P*
Salgey/Carros HT	*P*
Carros/Carros HT	*P*
Symocc CT	*P*
Elepal HT	*T*
Phaaru DT	*T*
&	*&*
&	*&*

Other common or important species observed

Trees	Shrubs	Graminoids	Forbs
Pincon	*Spibet*	*Scimic*	*Equarv*
&	*Salboo*	*Carmic*	*Equhym*
&	*Amealn*	*Phlpra*	*Astocc*
&	*Arcuva*	*Agrsto*	*Galbor*
&	*Rosaxx*	*Poapra*	*Taroff*
&	*Cradou*	*Calcan*	*Senfoe*
&	*Symalb*	*&*	*Fravir*
&	*&*	*&*	*Cicdou*
&	*&*	*&*	*&*
&	*&*	*&*	*&*

Noxious weeds observed	*Cenmac*	*Cirarv*
&	*&*	*&*

Polygon Size, Channel, and Riparian Functioning Information

Average Riparian-Wetland Zone Width (ft) *125*

Riparian-Wetland Zone Width Range (ft) *30* to *200*

Rosgen stream geomorphology types and percents *C4 - 8*

B4 - 1	*F4 - P*	*& - &*	*& - &*

BLM Standard Checklist for assessing functioning condition

Yes	No	N/A	Hydrologic	
Y			1	Floodplain inundation
	N		2	Active/stable beaver dams
Y			3	Sinuosity, W/D, and gradient in balance with landscape.
Y			4	Riparian zone width
	N		5	Upland not contributing to riparian degradation
			Vegetative	
Y			6	Diverse age-class distribution
Y			7	Diverse composition
Y			8	Species indicate maintenance soil moisture
Y	*N*		9	Root mass bank protection
Y			10	Riparian vegetation vigor
Y	*N*		11	Vegetative cover protects banks and dissipates energy
Y			12	Adequate woody debris sources
			Soils, Erosion, Deposition	
Y			13	Adequate dissipation of flood energies
Y			14	Point bars are revegetating
Y			15	Lateral stream movement is part of natural sinuosity
Y			16	System is vertically stable
Y	*N*		17	Stream in balance with supplied water and sediment

Functional Rating: (PFC, Functional-At Risk, or Nonfunctional) *PFC*
Trend for Functional-At Risk: (Upward, Downward, or Not Apparent)
Are outside factors influencing the condition: (Yes or No) *Yes* If yes, what are they? ***There are several locations with significant deposits of gravels within the polygon. Those may have come down the Thompson River from Murr Creek or they may have come from small tributaries which enter into the Thompson in the area of Bend. These gravel deposits do not appear to be effecting the functioning of this reach.***

Comments: ***There is a greater percentage of native vegetation in this polygon than in any of the others. Also, there are only a few locations with the introduced hay field grasses which dominate a lot of the areas in the polygons above. Our cross section goes through a small stand of PHAARU (see page A2.7, distances 81.6 to 84.0). It would be interesting to monitor that stand to see if it increases in size during the next several years.***

Appendix 5 - Photographs

Introduction

The photographs and their descriptions on the following pages should be self explanatory. The one feature to remember is that groups of photos for the cross sections and for the vegetation plots are tied to one of the hand drawn, cross section and vegetation plot maps which are in Appendix 1. The other six photos are labeled as General Photos. They were taken in polygons 3, 4, and 7.

Cross Section 1

Photo 1

From LP. Post near RP visible on opposite side of river in swath through PHAARU. The large CRADOU shown on map are visible to the right of photo's center.

Cross Section 1

Photo 2

From LP. Looking over PHAARU, SALEXI, BETGLA, and CORSTO, with conifers behind. Photo taken approximately along the lines of vectors B & C.

Cross Section 1

Photo 3

From RP. View across the river. The post near the LP is toward the back of swath through PHAARU. Photo taken along vector A

Cross Section 1

Photo 4

From RP. Looking over PHAARU at three large CRADOU (shown on map). Photo taken approximately along vector F.


Cross Section 1
Photo 1


Cross Section 1
Photo 3


Cross Section 1
Photo 2


Cross Section 1
Photo 4

Cross Section 2

Photo 1

From MP toward RP. Laser level set up to left of cross section line, which is visible as yellow tape. RP is below, and directly in line with second largest PINPON in group beyond laser level. Photo taken along the line of vector C.

Cross Section 2

Photo 2

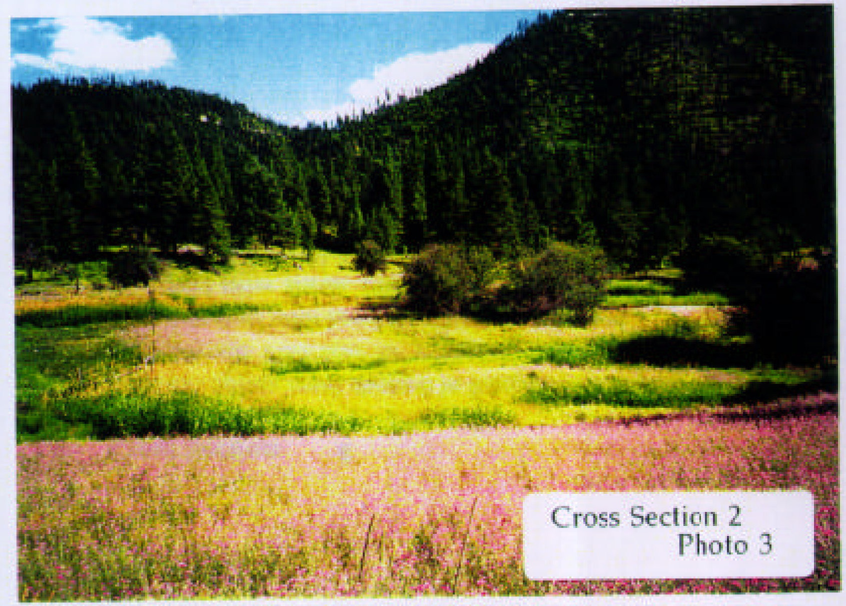
From LP. MP is just beyond short (~2') shrub in photo center to left of PINPON and to the right of the downed log in shade of larger shrub. Photo taken along the line of vector C.

Cross Section 2

Photo 3

From a location on the road in line with the lower, cross-valley fence of old exclosure. That fence is visible in the photo. The cross section is to the right of the shrubs in the right and center/right of the photo.

Cross Section 2
Photo 1



Cross Section 2
Photo 3

Cross Section 2
Photo 2

Cross Section 3
Photo 1

From MP toward RP along vector A. Vadan in overflow channel taking cross section reading.

Cross Section 4
Photo 1

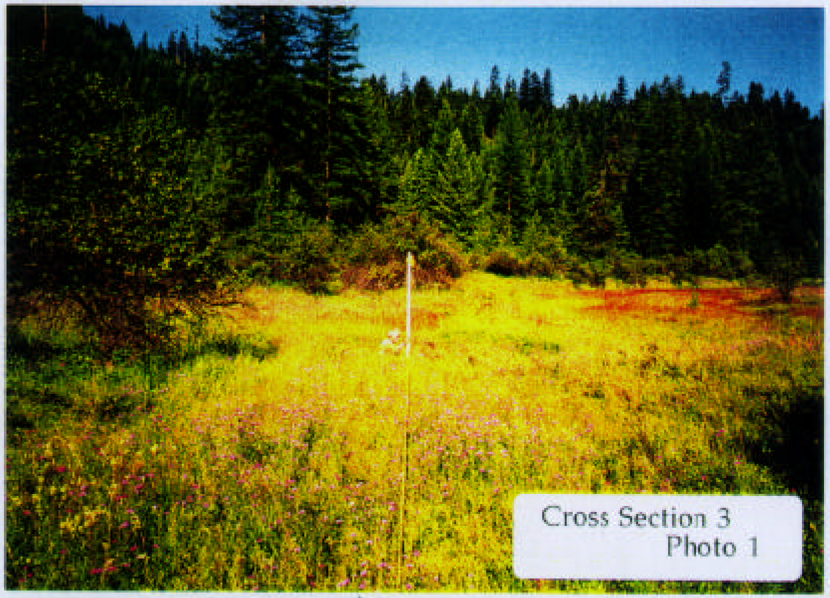
From RP. Vadan preparing to take cross section reading in channel. Laser level is set up beyond, and in line with LP. Note the tree directly beyond the laser level. That tree is at the end of vector B. Photo taken along vector A.

Cross Section 3
Photo 2

From LP. Tape suspended between LP and MP. Laser level near MP. CRADOU over RP can be seen in background, beyond and to left of laser level. Vadan on gravel bar in left of photo.

Cross Section 4
Photo 2

From LP. Spring creek channel in foreground, river beyond. Post near RP is slightly visible (more-so with hand lens) on far bank near first taller shrub. Photo taken along reverse angle of vector A.


Cross Section 3
Photo 1


Cross Section 4
Photo 1


Cross Section 3
Photo 2


Cross Section 4
Photo 2

Vegetation Plot 1

Photo 1

From post near upper end of overflow channel. Vadan in left edge of photo. Large larch northwest of plot, beyond part of old hay field. Vector A is from the photo point to the two larch (of the three closest larch with sunshine on their trunks) on the left.

Vegetation Plot 1

Photo 2

From post near upper end of overflow channel. Vadan in overflow channel which is the location of the vegetation transect.

Vegetation Plots 2 & 3

Photo 1

From southwest of post. Post in foreground. Scott measuring distance to large CRADOU along vector K.

Vegetation Plot 1
Photo 1

Veg. Plots 2 & 3
Photo 1

Vegetation Plot 1
Photo 2

Polygon 3

General Photo 1

From Shroeder Bridge. Broad B or F channel (Rosgen types) with graminoids and CRADOU lining both sides.

Polygon 3

General Photo 2

John Pierce on recently deposited gravel bar. Note the height of the bar in the left side of the photo.

Polygon 4

General Photo 1

John Pierce standing in six and seven foot tall PHAARU. Note the density of the plants on the bank.

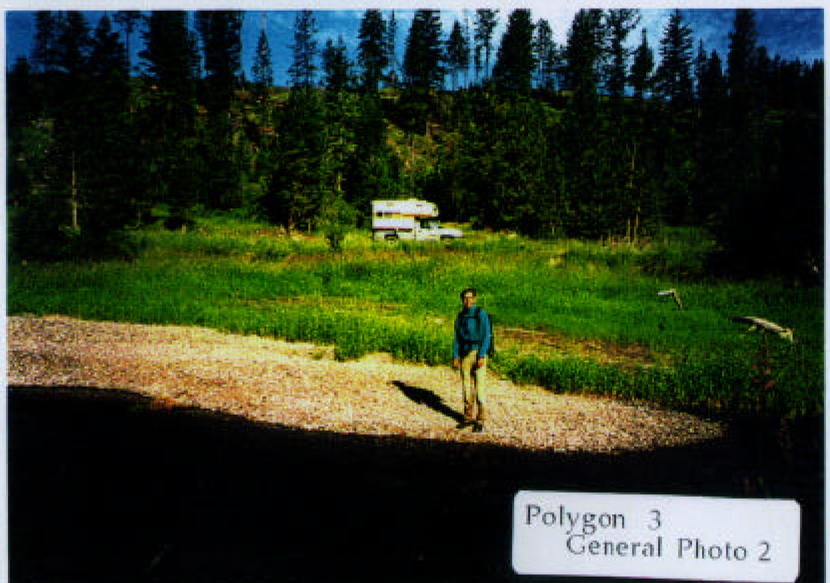
Polygon 4

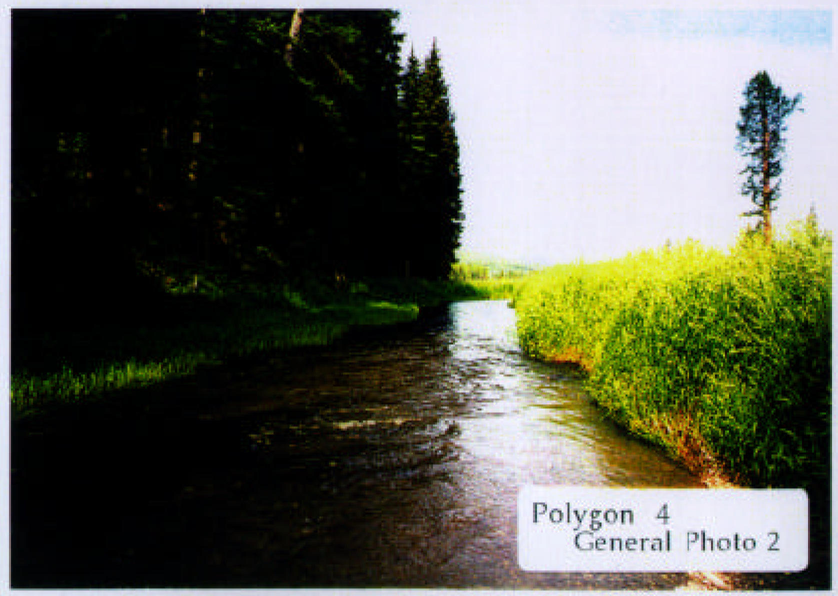
General Photo 2

At the low end of polygon 4. Tall stand of PHAARU on right bank and shorter graminoids (probably a native sedge) on the left bank.


Polygon 3
General Photo 1


Polygon 4
General Photo 1


Polygon 3
General Photo 2


Polygon 4
General Photo 2

Polygon 7

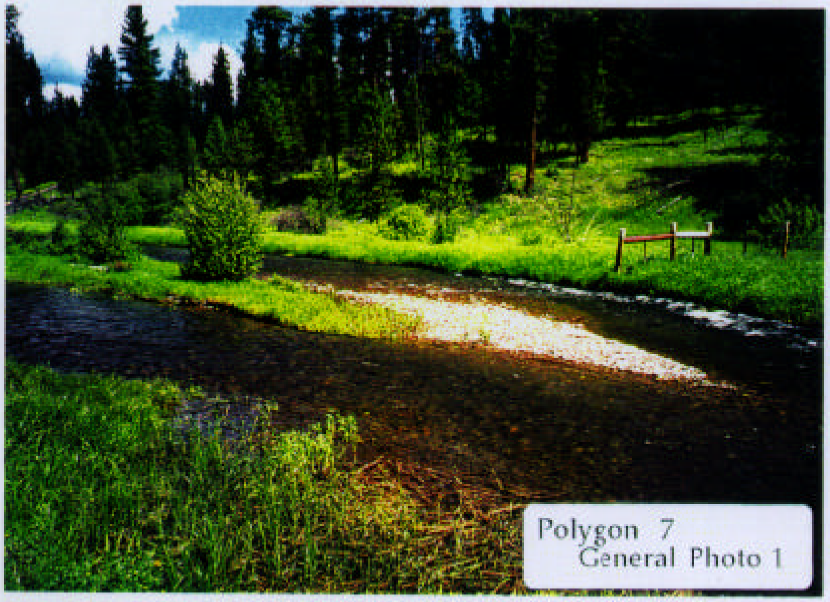
General Photo 1

River, small island, and fence at top of polygon 7. Note the lack of the tall PHAARU in this area.

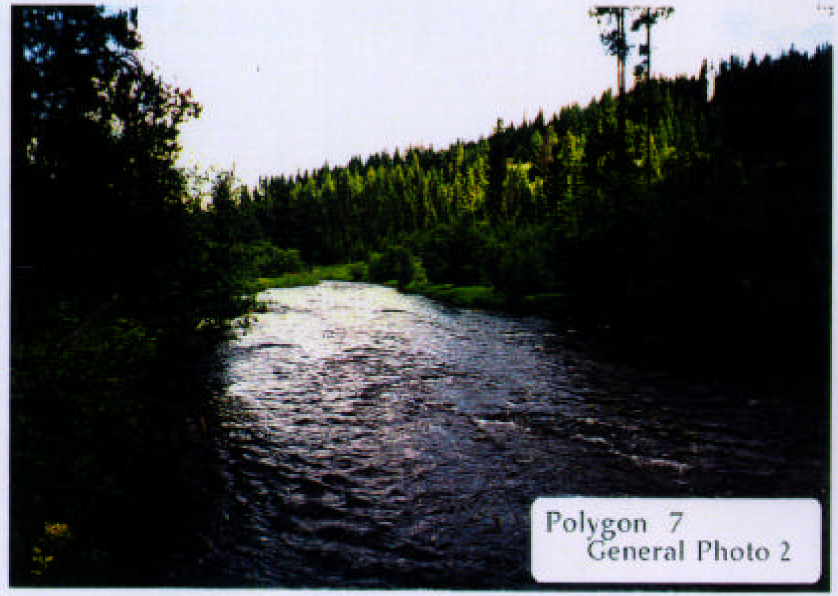
Polygon 7

General Photo 2

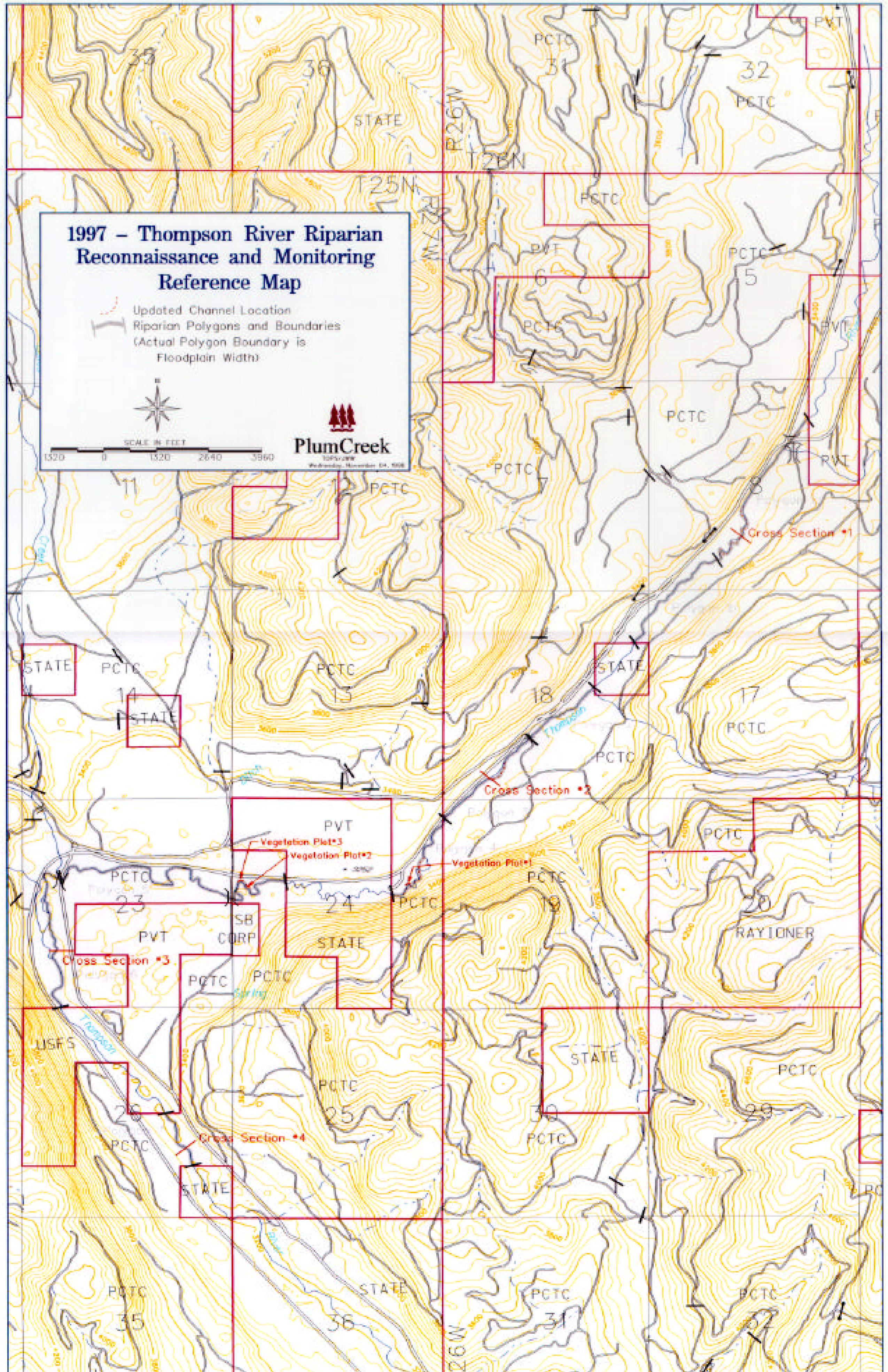
Shrub-lined river at the bottom of polygon 7.



Polygon 7
General Photo 1



Polygon 7
General Photo 2



1997 – Thompson River Riparian Reconnaissance and Monitoring Reference Map
Updated Channel Location
Riparian Polygons and Boundaries (Actual Polygon Boundary is Floodplain Width)
SCALE IN FEET
1320 0 1320 2640 3960
PlumCreek
T25N
T26N
R26W
R27W
Cross Section #1
Cross Section #2
Cross Section #3
Cross Section #4
Vegetation Plot #1
Vegetation Plot #2
Vegetation Plot #3
Thompson
PCTC
PVT
STATE
SB CORP
RAYIONER
USFS